DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA.

NARRATIVE.

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(With 14 maps and photographs.)

SOME years ago certain continental biologists experimenting with insects cut off the heads of some species and replaced them by the heads of other species in order to ascertain whether this grafting would be as successful with insects as it is with plants. The experiments were a failure. I was reminded of this queer optimism when I gazed early in October 1933 for the first time on Walfish Bay and its hinterland. Here an experiment of a similar kind had been made about half a century ago by two statesmen who, in their wisdom, had decided to separate the head from the body, the one walking away with Walfish Bay in the sack, and the other, thankful to have managed to keep the rump, hoping that by the application of powerful stimuli another efficient head could be grown. The war has brought much unhappiness to the world, but here and there existing anomalies have been cleared away; South-West Africa has much benefited by the restoration of Walfish Bay to its hinterland. The connexion with the rump is still precariously loose, only a narrow-gauge railway connecting Walfish with the terminus of the main railway at Swakopmund, and this only when the Swakop R. is dry, the bridge built after the war having been swept away by the river in flood, as if Old Man river were dissatisfied with the mandatory system. Improvements are slow in a poor country on which nobody but the Union will spend money *à fond perdu* under present circumstances; but progress is certain, the excellent harbour being the natural outlet for the country.

I did not expect to find so many buildings behind the harbour, a township in infancy, most of them built in the sands of the Kuisep R., and backed by dunes as far as the eye can reach, with a good water-supply from inland and a busy life when a boat has come in, a fleet of whalers lying in the offing. A fellow-passenger, an engineer, had told me that he had planted an avenue of trees at Walfish (= Walvis); and as trees suggest caterpillars, I had my first disappointment on African soil: I could not find the trees until I realized that they were right in front of me, but had failed to catch my eye. When our boat was gone and the luggage been passed through the customs and handed over to the forwarding agent, all was quiet, and the embryo town fell asleep to dream of its future.

The object of my visit to South-West Africa was a double one: to see the country about which I had heard and read so much, and to make zoological collections. Neither the British Museum nor Lord Rothschild's Museum at Tring had much material from South-West, and I hoped to supply at least to some extent what was wanted. Moreover, a country with a hot, dry climate to the rigours of which animals and plants are adapted in many queer ways is of great interest to the biologist. A further inducement to choose South-West Africa for a visit was a more personal one: a near relation and her family lived

on a farm in the highlands near Windhoek, where I could leave the bulk of my equipment, taking only what was required on each of the excursions planned. My young and energetic cousin, Else Lütgens, met me at Walfish Bay the day after my arrival and took charge of myself and my belongings. She had come down to Swakopmund with a lorry, and we arranged with the forwarding agents, Messrs. Brasch & Winderstein, that the lorry be loaded up at Walfish and then return to Swakopmund to pick me up and to take us to our destination some 400 km. inland.

During the railway journey to Swakopmund, 33 km. from Walfish, I saw crowds of sea-birds, most of them cormorants, perched on platforms erected in the water close to the shore by enterprising merchants in fertilizers. There was hardly any vegetation until we crossed the bed of the Swakop R., where tamarisks and herbage covered the ground. My cousin had arranged for me to stay the night at the comfortable hostel attached to the German Hospital, whereas she returned to Walfish to supervise the transport of the luggage, which she hoped would be at Swakopmund next morning. In the garden of the hostel a pair of weaverbirds were busy building nests, for play rather than for the serious business of raising a new generation, the season being still too early. The lorry arrived when it was almost dark. The load being heavy and the sand not having set hard enough (there is no road from Walfish), the transport had been a very arduous task.

It was 7 p.m. when we were ready to start, my cousin, myself and a black driver. Windhoek has an altitude of 1,650 m., and the farm Hoffnung about 1,850 m., so it was uphill all the way. For the first 100 km. hardly anything but sand and stones was visible in the landscape so far as it was lit up by our headlights, then scattered vegetation appeared, a small hare (*Lepus capensis*), startled by the lights of the lorry, ran for a short distance along the road, bushes became more numerous, with stunted trees among them, and we had the driest part of the coastal desert belt, the Namib, behind us. The road was better than I expected, with few places in disrepair ; but for long stretches the surface was transversely rilled like corrugated iron, shaking the lorry considerably and keeping us awake. Towards midnight we were in the neighbourhood of Usakos ; my cousin produced sandwiches and thermos flask, and we stretched our legs for a little while. At 7 a.m. we saw in the distance the tall trees of Okahandja. After the twelve-hours' run (about 300 km.) from Swakopmund the Hotel Müller was a most inviting sight ; we were ready for a good breakfast. The distance from Okahandja to Windhoek is less than 100 km. by road (69 by rail), and we expected to reach Windhoek before luncheon. On our way from the coast we had had a little trouble with the engine and tyres, but that was nothing as compared with what unkind fate had in store for us ; one accident after another delayed progress, as if fate wished to impress upon my mind the picture of a dead landscape under a fierce sun. The ground under bush and tree was bare sand or stones, most trees looked dwarfed and crippled, only in flat places and depressions large Acacias gave a hint of what the country would be like in the rainy season. Notwithstanding the general barrenness there were some bushes in flower, recalling a white-flowering Cistus of the Mediterranean countries and thriving when everything else seemed deeply asleep. Half the afternoon had passed away when at last some houses of Windhoek appeared in view, and we could now hope to get there before the punctured front tyre gave way altogether.

First impressions are stored in one's memory. The town on a wide slope with a background of hills was a most pleasing sight after the long drive. We left the lorry to follow when it had been put in order and went on in my cousin's car to her home, Hoffnung, less than 20 km. farther east, where Hans Lütgens, the husband of my cousin, acted as bailiff.

Hoffnung is a fine property of 18,000 hectares, lying on the north side of the railway to Gobabis, comprising a plateau with the main buildings, gardens and large dam, and stretching away into the mountains and beyond; the view from the plateau southwards across a deep valley, with the Auas Mountains in front and Khomas Highlands to the right, is beautiful and very extensive. Trees, bushes, rocks, sand and loam, and herbage below the dam promised to provide fair hunting-grounds for my purpose. Thanks to the courtesy of Herr Piepmeyer, the representative of the owners of the farm, and the loving solicitude of my relatives, I was comfortably installed and could organize my expeditions into the country.

The question of transport and assistants was soon settled. I bought at Windhoek a Chevrolet lorry to carry a load of a ton and a half, and engaged two German gentlemen, agriculturists who had been in the country for some years and were disengaged at the time. Herr Walter Hoesch had been recommended to me by Professor E. Stresemann, Berlin, as an ornithologist who knew the birds of the South-West; and Herr Werner Bartsch, a friend of my relations, would drive the lorry and take care of the commissariat. Two servants of Herr Bartsch, a Hottentot and his stepson, a Herero, were likewise to accompany us. Neither Herr Bartsch nor Herr Hoesch had ever made a skin for museum's purposes, but they soon learnt to skin small mammals and assist in collecting insects, lizards, frogs and all else I required for the British Museum. We had a pleasant time together and amicably shared the troubles and pleasures which one meets with on expeditions into the wilds.

These preparations required several visits to Windhoek, where I also had to pay my respects to the Administrator of South-West, present my credentials to the Secretary and see other officials. The Foreign Office, through the High Commissioner of South Africa in London, had recommended that all facilities be given me which were in the power of the Administration to grant to a biological expedition. Everyone was most helpful, and I got permission to collect any mammal or bird I wanted, with certain restrictions as to big game, particularly in the game reserves. As I had no intention of molesting giraffe and elephant if I should come across them and had no desire for trophies of the usual kind, I could easily keep to the letter and spirit of the general permit. Our plans were made, but several weeks elapsed before all was ready for a start. The time of waiting I employed in making a miscellaneous collection on Hoffnung, where some rodents, carnivores and reptiles were obtained and moths caught at my acetylene lamp. The only butterflies on the wing at this time of the year were *Pyrameis cardui*, *Hypolimnas misippus* and a few common *Pieridae*. Under stones there were beetles; scorpions and spiders, occasionally a gecko. Some Tenebrionid beetles and weevils were crawling on the ground, keeping quiet when approached, and a large Carabid, *Anthia*, was not rare even at this season, being often seen close to the house; man and beast avoided it on account of the strong-smelling liquid it ejects from the tail-end and which has given it the name of vinegar-beetle. The water in the dam was reduced to a muddy pool; there was no insect life on

the mud except a few Hymenoptera which came to drink. The most conspicuous among them was a large blue-black fossorial wasp (*Hemipepsis vindex*) which sailed through the air with the noise of a miniature aeroplane, a common insect met

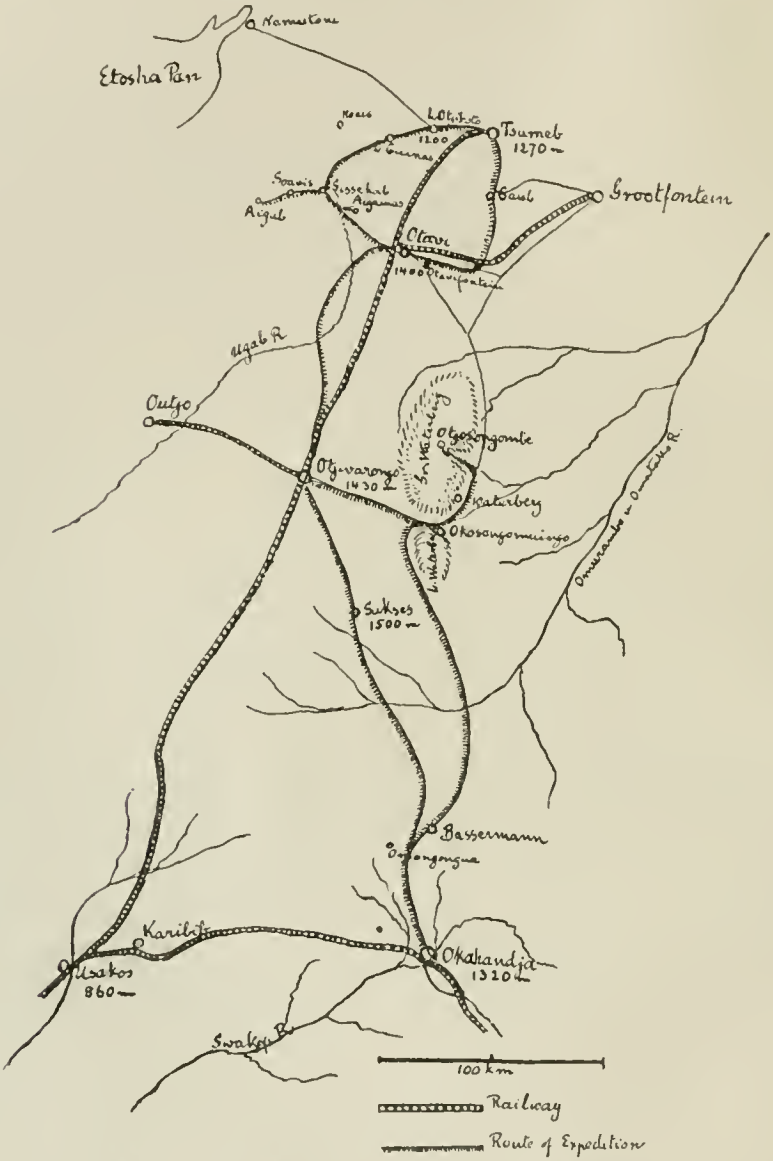

FIG. 20.—South-West Africa: northward route of expedition.

with again in many other localities in South-West. At an outpost of the farm, at Bellerode, natives brought me an aardwolf, *Proteles cristatus*, rare in these mountains. There were many burrows of the aardvark in the hill valleys, most of them old; baboons were frequently seen, and I was told that they sometimes came into the gardens. A colony of *Pedetes caffer* was observed near Bellerode,

these spring-hares coming out of the burrows at night, their eyes reflecting the light of the car ; the colony was later on wiped out by the flood. We tried in vain to trap a leopard which came to a water-hole in the hills ; he was too wary to be attracted by the bleating of a baby goat. A pair of ostriches sought safety in flight, the parents right and left and the two youngsters in between, the parents with a tumbling run as if pretending to be hit or trying to avoid a straight bullet ; we only looked at them. Hans Lütgens told me that the pair had had a large family, gradually reduced to the two we saw, probably due to decimation by leopards. Dassies (*Procavia*) were plentiful in the outcrops of rocks in the hill-sides ; they are easy to shoot, but difficult to obtain, as they slip down into the burrows and crevices if not killed instantaneously. The gizzard of a guinea-fowl I shot in the hills was crammed full of the spiky seeds of *Tribulus*. On a visit to Herr Blaschke's beautiful gardens at Klein Windhoek I inspected the tunnels driven into the hill-side for collecting the hot water for which this district is famous and found large colonies of four species of bats in them. One of the tunnels was occupied by *Rhinolophus aethiops* and *Rh. augur*, and the other by *Miniopterus smithianus* and *Nycteris damarensis*. I caught and examined many of these bats, but obtained only one specimen of a flea and a remnant of a dead *Cacodmus*, of the bed-bug tribe. The flea was a ♂ of a species described by Waterston from a single ♀ collected on a bat in a cave in the Transvaal. Although the water was little more than a trickle, the evaporation was strong and therefore the walls very damp and unfavourable for fleas to breed in.

South-West has sometimes a short rainy season in October–November, but this year no rain came. Though clouds formed occasionally when the wind was from the east, the much-needed rain remained an unfulfilled hope. For several years there had been too little rain ; the cattle suffered from lack of food and water, and in some districts a large percentage of them perished. Wild animal life cannot be expected to be abundant in such conditions, the struggle for life being too severe. I was aware of these circumstances when planning the expedition to South-West and deliberately chose to arrive during the dry season for a very definite object. The reports on the country mentioned the existence of permanent water in a number of places, deep small lakes like Lake Otjikoto, pools in river-beds, caves and fissures, and small brooks, in which fishes, frogs and crabs had been observed, but evidently never collected. For a visit of such places with the purpose of obtaining the fishes, etc., which were said to occur, the dry season, when the water was restricted, would be much more favourable than the wet season, when there might be too much water. I had written from England to Herr W. Hoesch, asking him to make a list of the places where we might expect to find fishes or where fishes were known to occur, and to ask the owners of the farms for permission to collect on their property for museum's purposes. Our excursions, therefore, were planned primarily in accordance with that object.

We started the last week in October, travelling via Okahandja northward across a flat sandy country, an open woodland with dry valleys and dry river-beds,[1] both little more than slight depressions, along which the trees were less stunted and the bush a little denser. Though on the whole rather monotonous, the landscape not showing much variety, the drive was not without its interest.

[1] A river-bed is called *rivier* in South-West. A road or a track is a *pad*. The natives address the white man as Mister ; not Baas, Herr or Master. " Willst Du diese Maus haben, Mister ? "

We were, of course, always on the look out for anything that flies, runs or crawls. Not far from Okahandja we found a female koodoo hanging in wire-fencing and vainly struggling to free itself. We managed to disentangle it by bending the wires, and the animal ambled away evidently uninjured. Later in the day we saw a male dead and decayed in the wires, having been similarly entrapped when jumping the fence. A few eland, hartebeest and jackal were seen, and now and again a bustard (*Cotis afroides*) shot noisily into the air as if catapulted straight up to 30 ft. or more and slowly planed down, alighting not far from the place where it had been flushed by the noise of the lorry. Engine trouble prevented us from reaching our destination. Long after dark the lorry refused to go any farther. As we learned later on, the Chevrolet engine has the trick of stopping when on a dead point; by pushing the lorry forward and backward the engine can be started again. It was fortunate that we were close under the Little Waterberg and only a few minutes' walk from Okosongomuingo, where we were most hospitably received by Frau Elisabeth Schneider and put up for the night. The place fascinated me when I saw it next morning in bright sunshine. I knew it from Dinter's description, who, years before the war and before the present house was built, collected on the mountain-side along the swampy banks of a rill of water several dozen plants then new to science. The water is now harnessed for household purposes, and most of the plants have probably disappeared. Our hostess is a keen botanist, and has constructed in front of the house a large rock-garden containing many interesting succulents. A new species discovered by her on the Waterberg is named after Frau Schneider *Lithops elisabethae* Dinter. The house is built on the side of the mountain well above the plain and affords a fine view of the wide gap between the Little and Great Waterberg. It is the most attractive of all places I have seen since in South-West, and I left it with regret. We were bound for Otjosongombe on the other side of the Great Waterberg. The distance not being great, we started some time after luncheon, trusting to arrive well before nightfall. All went well until we were going up the valley leading to Otjosongombe, when the Chevrolet again struck and would not budge another inch. However, we were not far from the farm and soon had help. Herr and Frau von Flotho and their sons bade us a cordial welcome, and here we stayed as paying guests for over a week.

The valley of Otjosongombe gradually rises and narrows and at about 1,600 m. ends abruptly, the sides being nearly perpendicular, and on the more shady side densely covered with forest. The Waterberg is a table-mountain of sandstone, with flat top and "Kranz," the surface of the top being broken by fissures and ravines. At the head of the valley there is a clear spring, which originally formed first a peaty swamp and then a small brook, but the water is now led in pipes to the house and garden. The gutter carrying the water overhead from the mountain-side to the buildings leaked and splashed over, the flat piece of ground behind the house being well watered, and here various species of butterflies disported themselves, the place being gay with several species of plants in flower. On a sticky *Boerhavia* I found the green and blackish forms of caterpillar of *Hippotion eson*, a species widely distributed in Africa south of the Sahara. The butterflies were mostly *Teracolus*. I consider Otjosongombe to be a very good collecting ground in and after the wet season. Though there were no fish and crabs, we made a good general collection, including a rare bat caught with a butterfly-net over the pool in the garden where a number of common bats

(*Rhinolophus*) were flying round and round. In the valley we found some burrows of a mole-rat (*Cryptomys damarensis*, formerly included in *Georychus*) and trapped a series of specimens showing great variability in the number and size of the white markings. The flea on them was the common *Xenopsylla brasiliensis*. One evening I noticed one of the dogs, a puppy, in the lucerne behind the house busy chewing something, and on inspection found that he had stolen four or five of the skins which I had left on a shelf pinned down to dry ; after that experience I kept the door shut. A hyaena (*H. brunnea*) caught in a trap provided a small series of a species of flea (*Echidnophaga larina*), the fleas being still fastened to the skin by the proboscis when the dead hyaena was brought down to the farm. It was too early in the season for moths, the numbers attracted being but small. One night, when out in the wood with the lamp, we saw on the ground an ant hanging on to a beetle, and on further search found two more ; it was a species of *Paussus*, the ant having the flat antenna of the beetle firmly in its jaws. It looked much like a small boy leading a cow on a halter. We had accidentally placed the lamp on a clear piece of ground where there was an underground ants' nest, many ants coming up through small holes. It was not a fierce species, but we shifted the lamp. Another night Herr Hoesch nearly trod on a spitting cobra ; the snake was lying across the path before the garden gate and Hoesch saw just in time that it was not a stick. The species is known to be attracted by human dwellings. To my regret the specimen, 5 ft. long, was summarily dealt with by a neighbouring farmer, who cut it in two with a hoe. Though we had as yet had no rain, the approaching wet season was heralded by toads (*Bufo regularis*), which lived in the pond and the irrigation ditches, concealed in daytime under stones and herbage, their deep, hoarse, guttural croak sounding like " poap-poap-poap," each croak separated from the next by an interval a little longer than the croak. Our host laughingly explained that these were the papists, the first in the field, and that the Lutherans, with their uninterrupted high-pitched " lutter-lutter-lutter," would appear after the first rain. In the fairly deep pond which I tried for water-insects I obtained some specimens of a glossy black toad with webbed feet (*Xenopus laevis*), which appears to be mute ; at least, I never heard it make a sound wherever I found the species. It is a queer, slimy-looking creature, which Herr von Flotho told us was accidentally introduced from Outjo with the spawn of carp. A few lizards were obtained lower down the valley where the soil was more sandy. After a stay of nine days we had to leave according to our programme. I should like to visit the friendly place again at a season more favourable for insects.

It was a long run from Otjosongombe via Otjivarongo northward to Otavi. When we had the Waterberg district behind us, we traversed again an undulated plain with hills in the distance. Small limestone ridges made the old road from Otjivarongo northward tiresome for us and going was not too good. As was often the case on this and the next excursion, our calculations as to the time of arrival at our destination were upset by little mishaps which caused delay, and it was long after darkness had set in that we reached Otavi, dusty, hungry and thirsty. The circle on the map of South-West representing Otavi is bound to mislead the traveller fresh from Europe ; he expects to find at this junction of the railways from Tsumeb and from Grootfontein a larger settlement than met my eye next morning. I made up my mind to regard in future the circle with a dot in it as indicating an embryo township, so that I should be agreeably surprised

if I found a settlement which had risen above this early stage. It would not take long to count the houses of Otavi, but, nevertheless, the place serves the present needs ; the traveller and the farmer find what they require in the stores, bakery, smithy and so on. The essentials of a township are there, and Otavi will grow to a larger community when the country becomes more populated, living on its own agricultural products rather than on imported goods paid for by the exportation of cattle. It lies at the foot of hills, with good arable land in the neighbourhood and mines in the hills, and has the prospect of becoming in time the busy centre of a prosperous district.

There had been some rain, but not sufficient to interfere with travelling by road. We were bound for Sissekab, a property situated, as the crow flies, about 40 km. north of Otavi. The owner, Baron von Maltzahn, had very kindly invited me to stay with him. The country between Otavi and Sissekab is mostly covered with bush and low sturdy trees, open ground of any extent being the exception. We were now north of the southern limit of distribution of the *Hyphaena* palm, groups of which were seen at intervals. The road was firm, but rough in places, the limestone cropping out now and again, and stones and boulders frequently covering the ground between the bushes. It was rather bold of me to inflict three Europeans on the hospitality of Sissekab, but our reception by the Baron and his family was so hearty and gracious that my qualms disappeared and we fitted outselves into the life at Sissekab without much ado. The property lies in bushland. On a large piece of open ground in front of the house there are several permanent open water-holes, which are small and not very deep and do not belong to any river system, but are fed by springs direct out of the ground, the water in the main pond being pleasantly cool for an afternoon dip. I did not find any animal population in the ponds except water-beetles and dragonfly larvae. We met here Herr Hoeh, the owner of a neighbouring farm, Soavis, who at once took as great an interest in our pursuits as Herr von Maltzahn and his family, and it was from him that I received several species of reptiles not seen at Sissekab. Among them was a *Varanus*, apparently dead, which I put into a petrol tin filled with a 4 per cent. solution of formalin, alcohol being too precious for this large lizard. The hole of the tin, closed with a piece of wood wrapped in cotton-wool, was open the next morning and the *Varanus* gone. Shamming death, and my disposition to reserve the alcohol for smaller reptiles, had saved its life.

Some time before our arrival Sissekab had been honoured by royal visitors, a couple of lions, which had taken toll of Herr von Maltzahn's cattle, and probably were still in the neighbourhood. Our traps were put in likely places, and three guns went out next morning on the alert for great happenings. But it was not the hoped-for roar that greeted them, but a continued squeal ; one of the Baron's pigs was caught in a trap. However, there were other and more dangerous creatures in the woods around Sissekab. One morning Herr Hoesch, when walking along a path to inspect some nooses, heard a rustling noise, and in turning round saw that a snake was following him, a black mamba, $2\frac{1}{2}$ m. long, an unpleasant companion which he shot. I preserved head and neck for the purpose of identification (*Dendraspis angusticeps*). The small viper, widely distributed in South-West, also occurred at Sissekab. As a rule, this snake is sluggish and does not move if placed in a bag ; the small specimen, however, which Herr Hoesch had in a butterfly-net was very excited and went

for the stick with which Herr H. touched it. When I held a bit of cotton-wool saturated with a weak solution of nicotine near its head, the snake quickly turned away and tried to escape. Injection of a drop of nicotine is the quickest way of killing a reptile, amphibian or mammal, death being instantaneous.

In this limestone region are a number of caves, of which some are well known to the farmers, while others are a secret of the bushmen, who live a roaming life in these extensive woods. To visit some of these caves was the main object of our stay at Sissekab. The first cave we explored was Aigamas, in the hills south-east of Sissekab and about one-third the way to Otavi, where fishes had been observed, but never caught. The cave is on an abandoned property in the woods, its entrance being situated on a hill-side. The former owner, I was informed, had built steps and ladders down to a platform above the water and here installed a pump ; all this had more or less decayed or been removed, and note of this was taken in our preparations. We were quite a party : our host and his two daughters, Herr Hoch and we three, besides our two servants. Calling at a farm not far from the cave, we asked for a guide, and at the recommendation of the farmer also borrowed a ladder. There was no road to the foot of the hill with the cave, but under the direction of the guide the lorry found its way among the trees and boulders. A stumble over a stony hill and we saw the large dark mouth of Aigamas. The descent into the interior is steep ; in places the rocks are perpendicular, in others wide crevices block the way ; it would have been quite impossible to get anywhere near the water without a ladder and ropes. Baboons and probably other animals frequent the cave at times, I was told, sliding and jumping down to the water and polishing the rocks so much that they offered no safe hold for hand or foot. The floor of the cave was covered with rubble, dust and faeces of baboons full of insect remains ; all was so dry that there were no beetles except some *Dermestes* and *Ptinus*. It was quite dark low down, and progress was only possible because we had an acetylene lamp and electric torches to light up the cave, which is much higher than broad. When von Maltzahn and Hoch—who were the most enterprising members of the party, and without whose help we should hardly have had success—arrived on the ledge where the pump had been and played the light downward, they did not see any water where it was known formerly to have been ; fishes had been seen in it, so it could not have been much below the platform. However, a stone thrown down bounded off the rocks into a crevice deep down below the ledge and a splash was heard. So there was water. But how to get at it ? As the crevice was too narrow for a round net, we fastened a strong butterfly-net on a wire bent the right shape, tied the net with four strings to an alpine rope, put a stone in as ballast, fastened a flashlight upside down on the rope and lowered the contraption into the crevice. When the net was pulled up after a little while, it was soaking wet, but with nothing in it but the stone. Herr Hoch tried again, giving more rope and waiting a little longer. When the net came up and was handed to me, a joyous shout resounded in the cave ; there was in the net a rosy, transparent cat-fish about as long as my hand, with a tiny black eye. Where there was one, there were more, and when our efforts had been rewarded by a catch of a dozen and a half of various sizes, we stopped. The net never contained anything else alive. I had hoped that there might be some Crustaceans or water-insects along with the fishes, but my examination of the contents of the net each time it came up had only a negative result. Though Herr Hoch found a dead bat, there were

evidently none asleep in the eave, else the light and our calling to each other would have disturbed them, and we should have seen them fly about. The fishes subsist, I presume, mainly on the insect contents of the faeces of the baboons. The water-level was exceptionally low at the time of our visit, approximately 70 m. below the entrance to the eave and 10 m. below the ledge on which von Maltzahn and Hoch were standing. In the rainy season, when the water has risen to a high level, it will not be so difficult to get at the fishes ; but even then, considering the distance from Otavi and the outfit required for getting down to the ledge, an explorer must expect that each fish will cost him far more than its weight in gold. That I did not obtain any Crustaceans is no proof that there are none in Aigamas. A baited trap left for a day in the water during the rainy season might have positive results.

Another cave with water, Aigab, was known to exist some 25 km. west of Sissekab. Our friends had not yet been there and only had heard that it was somewhere off the old oxen-wagon track from the coast to Grootfontein, too vague a description to attempt a drive through the bush in search of the cave. Herr von Maltzahn, therefore, engaged a Bushman as guide, a tall and evidently intelligent fellow, probably a cross with Herero. We went via Soavis, where Herr and Frau Hoch joined the party, and then followed the old track, now so completely overgrown that we often went wrong, a halt being called until the Bushman found the track again and waved us on. It was an in and out between trees, over bushes and stones, regardless of the tyres and the pain the bumping might inflict on the merry party of three young ladies and five men, besides the two black servants and the Bushman. We got to the cave all right ; it was a deep hole on almost level ground, most probably a cave with the roof fallen in. After some climbing and sliding down, the very blue water could be seen, the light penetrating to the surface. We again used a butterfly-net on a rope, but to our regret found the water completely covered with a thin crust of gypsum, or another compound of lime, which excluded the air. There was no life at all in the water. In spite of this disappointment we enjoyed our alfresco meal. We had some discussion about another eave in the same region, but much farther away. After a confabulation of our host with the Bushman, it appeared fairly certain that there was no life in that eave either, and perhaps even no water at this time of the year. So we decided not to make another attempt at fishing in the woods.

Close to the house I found a few *Teracolus*, widely distributed species, and saw no other butterflies worth mentioning. The moths, however, and the beetles at the lamp were quite interesting and fairly numerous, particularly after some good showers of rain ; Sphingidae and Saturniidae were entirely absent. Though the collections made at Sissekab were not large, we had got what we chiefly came for, the fish of Aigamas, and now we could take leave of our kind hosts and wend our way farther northwards.

Our track through woods of the same kind as those around Sissekab was of no special interest, nor had we time for delay on the way, as we wished to visit that day two lakes, Guinas and Otjikoto, both reported in the literature on South-West as containing fishes in great numbers of individuals. Both are in the open country.

Lake Guinas is a very deep, almost circular hole with a diameter of about 100 m., the walls being quite sheer except in one place where the Bushmen we

met here managed to climb down to the water. On a platform high above the water a pump was installed, supplying a tank on the hill-side with water for cattle. No harm had been done to the fishes by the pump ; for we saw them in small shoals swimming close to the surface, probably hunting for insects that may occasionally drop down. They were at once attracted by a few crumbs of bread we threw to them, and it was therefore easy to catch a sufficient number by letting down a butterfly-net baited above the rim with a crust of bread and pulling it up when several fishes had assembled at the bait. Some specimens were nearly white, others piebald, and others again blackish without white markings. A species often seen by travellers, but unknown to science.

Lake Otjikoto lies east of Lake Guinas in the direction of Tsumeb. It is larger than Guinas, its dimensions being about 250 m. × 200 m., and surrounded with trees and bushes, *Ficus*, *Euphorbia*, etc., very interesting and beautiful. The water is inaccessible except at one side, where we could climb down and use a net with a long handle. A large pumping station which formerly supplied water to the copper mines at Tsumeb, 17 km. distant, was still in existence, but no longer in use, the mines being closed. According to descriptions we expected to find the fishes as numerous as in L. Guinas, which was not the case. We obtained only a few specimens, although we left a baited trap in the lake overnight. It is possible that the interference with the water by the mines has destroyed the fish or that the water got slightly poisoned from the cannons and ammunition thrown into it before the German force surrendered. However that may be, the fish was rare at the time of our visit. Dinter [1] speculated on the relationship of the Guinas and Otjikoto fishes and their origin. We now know that they belong to different genera, are normal in development of their eyes, and are no doubt relics from a former river system that have become modified during their long and absolute isolation. Both lakes give one the impression that they were originally caves, of which the roofs have fallen in ; that is also the explanation given by a tradition among the Bushmen. A species of lizard was common at one side of the lake, but very difficult to catch. At the lamp we got for the first time a Saturnian, *Usta wallengreni*, and when bedding down in the veranda of the caretaker's house some geckos I had not seen before found immortality (I hope) in an alcohol container.

The road to Tsumeb showed signs of the worst deterioration rain causes, the ground being so much softened in places that the wheels sink in and spin round and round without taking a grip. In such circumstances chains around the tyres are a necessity. The driver avoids the dark patches in the road, and it is generally wise to follow the ruts made by a previous vehicle which has found a safe passage among the bushes. On entering Tsumeb one gets the impression of a town, with gardens, trees, and houses like small European villas, a refreshing picture after a drive through bush and over bare ground. But the closing of the mines was the death-knell for the place. The huts on the hill-side for the 2.000 natives employed in the mines were empty, and the engineers had left, only the director and a skeleton crew remaining to prevent the machinery from deteriorating. Tourists who come so far north will miss the comfortable hotel where we put up for a couple of nights and which, we were told, would close down in the near future. The electric plant was still functioning, and crowds of the white Saturnian, *Usta wallengreni*, were attracted, the moths swarming about the lamps

[1] *Botanische Reisen in Deutsch Sudwest Afrika*, p. 68 (1921).

and many tumbling to the ground. When I saw this spectacle, I understood that Mr. Pemberton had not exaggerated when he told me in sending 80 specimens of this moth collected at the lights at Benguela that he "could have caught hundreds more." Pemberton's catch contained only females, and all the other specimens at Tring were also females. Therefore I examined every one I could get hold of as to its sex, and thus obtained several males among the crowd of females, in this case the heavier sex being more partial to the lamps than the male. There is hardly any difference in the sexes of *U. wallengreni* apart from the antenna, forefoot and abdomen. I did not see anything else of special interest at the lamps. In eating soup at dinner a small bone stuck in my throat; my companions were startled by the colour of my face. I grabbed a forceps in my pocket to pull the bone out, when it came away by itself. What a relief! I wonder whether the moustache was originally developed as a filter, before it became a doubtful ornament.

My plan to pay a short visit to the game reserve at the Etosha Pan could not be carried out. The road was by now too bad for the lorry, and to wait for the regular carrier to take us to Namutoni would have meant spending another ten days in this district, which I could not well afford.

Our programme mentioned one more farm with permanent water in which there were fishes, Otavifontein, which we could visit on our way back to Windhoek. Instead of going along the railway to Otavi, we took the eastern route via Gaub, which is longer, but more interesting, leading gradually up through woodland. At the highest point we saw numerous specimens of that queer succulent *Cissus* which looks like a tree-stump and does not in the least resemble its near relatives, the Virginia creepers and grape vines. After the divide we came into a wide valley with flat bottom, flanked by wood-clad hills; teams of oxen before ploughs, grassy glens running up into the woods, a scene of European character. Beetles were more numerous on the road than before; the large Cicindelid *Mantichora*, the first of its kind observed by us, was fairly abundant, hunting on the road in the sunshine. But no butterflies played at the edge of the wood and the ditches. Far down the valley in a damp place, clusters of *Crinum* were in flower, their white blossom streaked with pink being very conspicuous on the still rather bare ground. Of course, we arrived at Otavifontein after dark; late arrival had almost become a habit with our lorry.

The large farm, belonging to the Otavi Mining Company, was under the management of Herr and Frau Böhme, two Holsteiner as fit, capable and industrious as they make them in that province of Germany. Herr Böhme and his daughter proved to us each evening before sunset that the hot climate, which is usually considered to have a deteriorating influence on body and mind, has the contrary effect on their energies. The performance of father and daughter in the garden at the horizontal bar took our breath away and made us feel slack and clumsy. This picture is still very vivid in my memory. Our hosts were great lovers of animals; dogs and cats galore about the premises. The cats bred freely, and evidently none were killed. It was all very friendly and homely, and the cats soon treated me as one of the family. For, on coming home one afternoon, I found a mother had made herself comfortable on my bed and presented me with five kittens; I put them in a corner on a rug, but when I returned that evening they were back on the bed with another cat as nursemaid. After various futile attempts to keep the bed for myself only, some chloroform and

naphthalene on the spot chosen for the nest offended the delicate senses of the cat so much that she definitely accepted the corner behind a wardrobe as a better place for the kittens.

A female eland and some other antelopes, which had been picked up when young and helpless, were in enclosures, the eland being free to walk away if it were so inclined ; it had adopted a paddock as its home to which it always returned from a stroll in the wilds. One such excursion had resulted in the birth of a baby. According to Herr Böhme's experience, the eland is the most frugal antelope ; it can subsist in barren places where other antelopes would perish, and it might really be turned into a domesticated animal most useful in a country like South-West.

On the evening of our arrival, before reaching the farm buildings, we had crossed a small brook by a bridge, the first road-bridge we had seen since leaving Windhoek. At this time of the year the brook was about a foot wide and ran merrily in its narrow bed from the slightly higher ground to the garden of the farm. It originated in a small swamp on flat ground near the Police Station, a short walk up the wide valley or plain, and in the pools of the swamp as well as in a pond in Böhme's garden a small fish abounded, a new subspecies of a species widely distributed in Africa. It has, like its relatives, the habit of taking its young into the mouth for protection ; on slightly pressing the head sideways a dozen babies shot out of the mouth. Luxurious vegetation along part of the brook, accumulations of palm fronds and the leaves of banana trees looked promising for trapping mice and shrews ; but when I saw the many cats, I became doubtful. In a competition between them and myself, they would have the advantage over me, as they knew where to go for their prey on their home territory. There was also another competitor, which I saw rolled up on the base of a banana leaf, a small Python, about the thickness of a child's arm and over 3 m. long, a beautiful sight in the bright sunshine. It glided slowly away when it felt our touch of the leaf. At night a species of gecko was plentiful on the outside walls of the house. Above the water swarmed several species of Odonata ; but in the water I found only the common *Cybister*, ubiquitous in South-West. We did not see any frogs except a specimen of the bullfrog which had been thrown up by the plough, and which I rejected, because it would have filled a whole jar and required the sacrifice of more alcohol than I could spare.

Life on the farm was very active ; agriculture was obviously much to the fore. The loamy soil looked as deep and fertile as if anything could be grown, contrasting greatly with the sandy or stony ground so usual in South-West. *Usta wallengreni* came to the lamp in company of beetles and a small number of other moths. Collecting with the lamp on flat ground is hardly ever very successful. In the garden around the house a *Mylothris* and other Pierids flitted about, and the roses were eaten by some large species of *Mylabris* (Meloidae), called the rose-beetles by Frau Böhme : local adaptation of a name. South-West would be a self-supporting country and could carry a much larger white population if the majority of farms were like Otavifontein.

The return journey to Windhoek was uneventful and very much like the outward journey. The new portion of the road from Otavi to Otjivarongo was now open to traffic. Its surface looked good, but was as yet innocent of tracks, a bad sign. We ventured on to it for a short distance and then turned across the bush to the old road, preferring to be shaken up by the stone ridges to sinking

in the sand, perhaps for hours. When we struck the railway, we stopped to collect what there was entrapped on the inside of the rails ; mostly Coleoptera, such as *Calosoma*, Tenebrionids and Curculionids. The Waterberg appeared on our left and in good time for luncheon we arrived at Otjivarongo, the centre for the Waterberg and Outjo districts, a place with two good hotels and apparently a considerable traffic. We slept at Sukses (1,500 m.), a small settlement at the east side of the Omboroko Mts., which run up to nearly 1,900 m., being a little higher than the Waterberg. The highest point in this region is the peak of the Etjo Mts., which rises to 2,086 m. and looks inviting from the distance. None of the river-beds we crossed had any water, and the sand of the pad was still firm, permitting us to travel at a good speed (and in consequence to see everything more or less in a haze). From Otavi to north of Bassermann we were on the east side of the north-south divide, all the rivers belonging to the Omuramba system, a tributary (if it has any tribute to convey so far) of the Cubango, which flows into the Zambezi. The fish of Otavifontein, therefore, may be expected to occur also farther east, if there is any suitable permanent water. From north of Bassermann to Okahandja and Windhoek the rivers are part of the Swakop river system flowing into the Atlantic. The cordial welcome at Hotel Müller, Okahandja (1,320 m.), was mutual. Herr Hoesch introduced me to Herr F. Gaerdes, master at the German School, a man with a wide outlook on life and much devoted to nature and its history, and also to Dr. Sigwart, the veterinary surgeon, both of whom knew South-West well and could give me interesting information.

On our way up to Windhoek I noticed in the neighbourhood of Teufelsbach that Pierids had meanwhile become plentiful among the bushes between the large Acacias ; but we were in a hurry. Two months later I regretted that we had not stopped a couple of hours and taken what we could get. For when I went to the same place in the middle of January there was no abundance of specimens and most of them were in a battered condition. It is certainly wisest on such excursions to take what you see and not to leave anything to a future occasion.

At the end of November nature was much the same at Hoffnung as I had left it a month before. Rain had remained in the offing. Despatching the collections, repacking at Hoffnung and revictualling at Windhoek did not take long, and the first days of December saw us on our way southward. It is a stiff climb for car and railway over the Auas Mts., an imposing chain reaching above 2,400 m. at its highest point. The mountain-sides are covered with forest of the usual open type, denser in the ravines, with some tall Acacias in favourable places. It looked a good district for a bug-hunter's camp, but at this time of the year water and insects were equally scarce. In going down to Rehoboth we made a detour via Rehoboth station (100 km. south of Windhoek) which has the better pad. The hotel looked spacious and cool, and a drink did not come amiss this hot afternoon. From the station to Rehoboth itself (11 km.) the pad runs on and sometimes in deep sand, and is not everywhere easy to negotiate for a heavily laden lorry. I had read and heard much about Rehoboth, the centre of the Bastard's country, and had conceived a rather different idea from what I found. The house of the District Commissioner, the church with its tall steeple, the hotel where we stayed for the night and some other buildings came up to my preconception of a centre of a large region which has the reputation of having

the best grazing grounds in all South-West; but the rest of the dwellings were very modest, the population preferring, perhaps very wisely, the comforts of the simple life to the arduous toil and frequent disappointments of the white settlers. Rehoboth, built on flat ground which is covered with sand and loam

FIG. 21.—South-West Africa: Walfish Bay to Windhoek, and southward route of the expedition.

and rises towards west, may appear to be a mean town judged by European standards, but viewed as a landscape it has great charm. The large and healthy Acacias which abound make you forget the human dwellings. Gold had been discovered in the plateau west of Rehoboth; many people had taken up claims,

some we saw washing for gold and others examining the outcropping stones, and there were diggings here and there, all the work being preliminary, and hope drawing a cheque on the future. The small man can hardly tackle the ground with success, there being no water available for his purpose, and the capital required for mining on a large scale will not easily be forthcoming for a risky undertaking. One would gladly wish the goldfields to bring in additional revenue to the exchequer of the Administration, the finances of the country being sadly reduced since the partial closing of the mines. The farms do not pay income-tax ; indeed, few of them would be able to bear the burden, the climate being so exacting and the rains so unreliable that the farmer has to accumulate reserves to keep himself out of the bankruptcy court when prolonged drought kills his cattle or excessive rain destroys his dam.

Our pad to the Naukluft Mts. led across the goldfields, an undulating plateau covered with stones. In the rainy season there will be many flowering plants, succulent, bulbous or creeping. Some of the dry rivers contained bushes and trees, but the hills we crossed or along which our pad ran were practically bare. The road frequently forked, and as fingerposts were mostly conspicuous by their absence, it was not always easy to find out from the map which was the right pad to the Naukluft, and once we got wrong, following a track which ended in a wooded ravine at the shack of a couple of Boers. After crossing a ridge, mountains loomed up in the distance with a dark belt at the base indicating a wooded rivier. Here we found Büllsport (= Buellesport), a farm belonging to Herr Rudolf Strey, who invited us to stay with him for a while. Herr Strey had first lived farther down the rivier in between the hills, but had found the present place on the border of the Büllsport plateau close to the Naukluft Mts. more suitable for farm buildings, there being good water in the ground, loam for a vegetable garden and wood in the rivier close by, the only drawback being occasional sand storms. The rivier runs west in between the Naukluft Mts. and the Rand Mts. and loses itself in the sands of the Namib. The Büllsport plateau is well known in Botany for the number of plants there discovered ; however, the Naukluft Mts., which consist of porphyry, do not seem to have been explored botanically. We spent several days at Büllsport, as grateful to our host for his assistance as for his hospitality. He conducted us to the only permanent open natural water-hole on the Büllsport side of the mountains. Under Herr Strey's guidance we went up the hill-side to a valley with flat bottom and shut in on three sides by steep mountains, and left the lorry in the shade of a tree close to the ruins of the German Police Station ; a peaceful spot and much to be recommended as a camping ground from which to observe and explore the fauna and flora. At the far side of the valley, a steep gorge requiring some climbing up the rocks was a watercourse in the wet season, but showed now only a little moisture here and there until we came to a corner shut in by high walls where there was a deep pool, for the greater part overgrown by reeds. There were neither fishes nor crabs in the cool water, but a species of frog, not quite the size of *Rana temporaria*, was quite abundant, some greener than others (*Rana fuscigula*). A leech was also plentiful, and we likewise netted water-beetles, Rhynchota and larvae of dragon-flies. The leeches were hungry and at once attacked Herr Hoesch, who ventured to walk into the pond with bare legs, and demonstrated *ad oculos* that our friend belonged to that branch of the Hoesch family which is not blue-blooded. In these mountains occur baboon, zebra, klippspringer, the

only antelope we saw. Near the Police Station among boulders, the Rock Rat (*Petromys*) occurred in some numbers, one of the most difficult rodents to skin on account of the softness of the tissues.

When eating our luncheon under the tree of the Police Station, fossorial Hymenoptera were attracted by our drinks. When I sprinkled some water on stones, these insects were so intent on imbibing the moisture that one could catch them with a forceps. More came along, evidently having noticed the presence of water from some distance.

At the farm we did some moth-collecting in the rivier, and then placed the lamp near the house, where two species of Noctuids came to the cage in very large numbers, to the astonishment of my companions, who had never seen such a sight. I myself was not surprised, as I had had the same experience at Bellerode ; the species are evidently partial to the kraals of cattle and to trampled-down herbage growing in farmyards. *Polydesma quenavadi* was the commonest species, but at Büllsport also a species of *Clytie* was abundant.

The pad from Büllsport to the true Naukluft valley runs in a southerly direction and, passing the farm of Herr Schwarz, turns south-west. It is no great distance from Büllsport. We made camp near the entrance to the narrow part of the valley under some trees where a placard informed the visitor that this was the best place for a camp. We walked up the valley to explore the lie of the land and were much pleased to find pools of clear water right up to the top of the valley, where it widens into a plateau surrounded by mountains. Here was the second German Police Station of the Naukluft Mts., now completely in ruins. There being plenty of water close by even in the driest season and therefore fodder for cattle, I wondered that nobody had settled in this place so ideal for a man who loved nature and his own company. The road leading up to the police station had become impossible for vehicles ; a new pad would have to be made, preferably along the mountain-side where it would be safe from the rush of water in a really wet season. All the water-pools had their inhabitants : frogs, tadpoles and crabs ; the tadpoles moved so fast on our approach that at first glance I mistook them for small fishes, of which there were none. The valley is narrow, a ravine, and, judging from the accumulation of sand and stones where it widens, there must at times be a brook running with considerable force. It joins a wider rivier that turns westward, ending in the Namib, being separated from the Fish river system (tributary of the Orange River) by the Büllsport plateau and the Tsaris Mts. According to information received there is, in the lower reaches of this rivier, a deep valley with permanent open water, which it might be worth while to visit. Crevices in the vertical rocky valley sides were the home of *Procavia capensis windhuki*, from which we obtained some specimens of *Procaviopsylla*, a genus of fleas confined to these rock dwellers. These fleas are closely related to rodent fleas, and we assume that a change in their morphology has taken place in consequence of the change of host. We know of several cases of this kind among fleas.

A few hundred metres from camp there were, at the bottom of the valley in damp or wet places, clumps of *Mentha longiflora* in flower, 4 ft. high, the inflorescences of which were visited by several Lepidoptera. Since Otjosongombe I had seen but few butterflies and here were several quite new to me. Of the three *Acraea* the commoner one was vivid red on the upperside and white beneath, a most attractive sight. It was *A. hypoleuca*, of which only two

specimens were known, one being in the Hope Department at Oxford and the other in the Zoological Museum of the University of Berlin. I took a series of both sexes, most specimens being quite fresh. Along with this species was *A. stenobea*, described from Bechuanaland and still rare in collections. Several Pierids and Lycaenids also visited the *Mentha*, some of the Pierids being strongly modified local forms, differing particularly in the reduction of the black markings. There was a single species of *Syntomis* on the mint, closely related to, or identical with, a species known only from South Africa, *S. johanna*. Under stones and herbage Carabids and Staphylinids were concealed ; a bombardier beetle occuring here behaved much like the European *Brachinus*. The frogs appeared to me the same species as those collected above Büllsport ; they were quiet, probably because the spawning season had been over for several weeks, the development of the tadpoles being well advanced. But it is also possible that this species does not give concerts, only grunting like the British Grass Frog. The wind coming from the east caught the wide entrance of the valley and blew upward ; collecting at the lamp, therefore, was less successful than it might have been in still weather. After our frugal meal the last evening in camp we had an unexpected visitor. Herr Bartsch suddenly jumped up and called out " A scorpion—no, a gecko ! " It was a slowly moving black-and-white gecko-like reptile, several inches long, which held the tail obliquely upward, rapidly moving its tip up and down as in imitation of a disturbed scorpion. The piebald colouring representing light and shade would render the specimen at rest almost invisible among the debris, whereas in the light of our lantern the crawling reptile was quite conspicuous. The tail is probably always raised as we saw it, a frightening attitude against any would-be aggressor. We searched the surroundings of the camp for more specimens, but found none.

On our way from the Naukluft eastwards we called at the house of Herr Schwarz for information about the best pad to Maltahöhe, drank coffee and exchanged news as is usual on such occasions. Politeness requires to refresh any caller with coffee or tea and to feed him at meal times, rain and cattle being the subject of conversation. A young Englishman who had dropped in that morning on his way to one of his farms gave me an impressive illustration of the all-importance of rain. He owned a hundred thousand acres, he said, and had ten thousand head of cattle, and neither he nor his animals had anything to eat or drink on his farms. His cattle were all away in the Rehoboth district as paying guests ; they cost him a great deal of money, and if this year did not bring sufficient rain, ruin would stare many of the farmers in the face.

This ardent wish for rain was on the point of being fulfilled. It had been raining that morning to the east from where we were, and heavy clouds were still piled up. We were going in that direction. The plateau we had to cross in a south-easterly direction was flat, with slight undulations and occasionally a hill with flat top and boulders at the base, such sandstone hills being quite a usual sight in South-West (cf. fig. 25). After a couple of hours we came to the area where the shower had come down, and passing a farm-house a woman hailed us and asked us to take a parcel to Maltahöhe. She had been to her dam and was very happy that there was water in it. " The first rain for four years," she said ; " my 800 cattle are on another farm where they cost me 6*d*. a head a month, and there is no income ; here on my 20,000 hectares there is hardly enough food for my 150 goats." The prospect of making a comfortable living on this plain

covered with sand and pebbles seemed to me as bleak as the landscape. The lady gave us some directions about the pad, which she thought would be quite all right in spite of the shower of rain. The going was indeed still good and we were at first much interested when we found farther east the thirsty landscape covered with puddles and saw the water running in all directions, collecting in small and large depressions. But our interest soon became very personal: the pad gradually became a brook too deep for the lorry. We tried the left side for firmer ground and stuck in a swampy ditch, and with difficulty crossed the pad to the other side, where we found conditions just as bad. Late in the afternoon we were confronted by a rushing stream with vertical banks, which effectively stopped any progress. As it would be dark in a couple of hours, we decided to camp near the river on a sandy piece of ground which was merely wet. A farm, or rather its windmill for pumping water, was visible in the distance, too far to get to us before nightfall some oxen for pulling the lorry on to dry ground. Fortunately there were trees along the river, some of them dry, and soon a fire was blazing and the kettle boiling. Under normal conditions we should have reached Maltahöhe at luncheon time, and here we were under a threatening sky trying to make merry with a cup of tea and the scanty provisions we had left. Groundsheets protected our bedding from getting wet on the soaked soil, but the air became so laden with mist in the night that the excessive absorption of water through the skin prevented us from dozing for long. Dawn was hailed with delight. The water had partly sunk into the ground and partly collected in the deeper pans so that the land could be explored for a possible passage out of this mess. While my companions worked hard to get the lorry over the water-logged ground, I sauntered about to look at and collect some of the insects, which were coming up from their underground nests. A daylight termite was the most interesting of them, running clumsily about, foraging, undisturbed by the rays of the forenoon sun. They were welcome soft fat morsels for the ants, which prowled about in numbers and pounced upon the helpless termite whenever they came near one, dragging it along to one of the entrances to their nest. We arrived at Maltahöhe twenty-four hours late and stayed for two nights to recuperate, instead of going straight on to Voigtsgrund. This proved to be fortunate inasmuch as we collected several frogs, lizards, mammals and beetles not seen by us before.

Maltahöhe, with two good hotels combined with stores, lies above the Hutap river on its north bank, an affluent of the Fish river, on a stony plateau. wind-swept and healthy, quite a fine dorp with school and police station, flourishing and declining with the fortune meeted out to the farmers of the district, Across the valley of the Hutap are high hills. The rocks consists of slate, quartzite and sandstone, varying in colour from reddish to grey and green. The Hutap was in flood, the river that had stopped us on the plateau probably being its upper reach. It is broad and in some places so shallow that we could walk across without removing boots and socks. Moth-collecting at night was out of the question, the wind being much too strong and there being no sheltered spot except behind a house. We had to concentrate in daytime on the heaped-up stones where lizards and a few small rodents could be obtained, and in the evening on the river with its frogs. The dry seed-pods of *Acacia hebeclada* contained a Longicorn beetle, two species of *Bruchus* in numbers, also a Hemipteron and a parasitic Hymenopteron. In the garden of the hotel earthworms were dug

up, and when dusk set in we were entertained by a frog-concert: "lutter-lutter-lutter . . . ," very loud and rapid. Here they were, the Lutherans of which Herr von Flotho had spoken at Otjosongombe. They were sitting in the water close to the bank or on the bank close to the water and were not difficult to catch, but it required walking barelegged in the water with a flashlight. The concert breaks off suddenly and after a short pause it starts again. There was one note rather higher than the rest and more metallic, which evidently was that of a second species,[1] and accordingly we paid special attention to this musician in order to procure at least one or two specimens of it. In the afternoon I went down to the muddy river with a net to have a try for fishes and beetles, of which I got none; but I caught a tiny frog, which at first puzzled me, as it could not be a young one of the Lutherans which were just spawning; then I remembered that very small species of frogs were known from South-West and other parts of Africa. A good find, I thought. In the evening we were attracted by a note sounding somewhat like castanets, which we attributed to a cricket concealed somewhere near the hotel. On following the note we found it to come from the valley and finally traced it to the river. It was the note of my tiny frog, of which about two dozen sounded their "nack-nack-nack," long pause, "nack-nack-nack" in the 200 yds. of the river we could explore. To catch them was a difficult proposition. Most of them were among herbage in fast-running shallows of the river, one calling here, another there; when one reached the spot the frog became mute, dived and called again a yard or two away. With perseverance we got half a dozen.

The stone-covered ground continued to Voigtsgrund (= Tsubgaris), a large farm famous in the country for its pedigree caracul breeding. The extensive buildings combine usefulness with comfort, and it did not take long to perceive that the establishment was managed on the lines of a well-ordered office, every member of the staff attending punctually to her or his duties; in England we should call it a model farm. We were hospitably received by Herr Middendorf, son-in-law of Herr Voigt sen., who was away at Swakopmund, and by Herr Voigt, jun., and two guest rooms were placed at our disposal. The buildings are above the rivier (fig. 24), palms and other trees giving shade to the main buildings. The rivier contained a series of permanent pools with a species of small fish, a crab and various insects. The dam which we visited one afternoon was some distance up the rivier, where there was a considerable area of land under the plough. On a large field of lucerne, the staple fodder for young animals and milk-cows, *Colias* swarmed in incredibly large numbers. We looked in vain for signs of the Striped Mouse (*Arvicanthis*) which we were assured occurred in the fields.

After a few days we moved to Satansplatz, farther down the rivier and recommended by Herr Middendorf as a place likely to be a good collecting ground. We found the name appropriate on account of the barrenness of the stone-covered ground and the exposure to the wind which sweeps the plateau. The empty dwelling-house was of the usual primitive kind, oblong, transversely divided into several rooms which open directly outside, one end-room serving as a kitchen. Very convenient for camping. No other buildings of the original establishment were left. In the wide and deep rivier below the house we found a chain of pools, some black from the dissolved droppings of cattle, others clear; there was even

[1] All the specimens we caught belonged to one species only; cf. H. W. Parker's account of the Herpetological collections, no. 82 (*Pyxicephalus delalandii*).—K. J.

some clear running water supplied by small springs in some shallow pools. A shower of rain had as yet no effect on the rivier. The right bank was steep and high, and here in crevices and on ledges Euphorbias and other succulents grew, emphasizing the dryness of the ground. The same little fish as at Voigtsgrund, only more abundant, the same crab and the same water-beetles. A large pool, however, partly covered with reeds, contained cat-fish too large for the small fish-hooks I had with me ; the fish went for the bait all right, but broke the hooks or bent them straight in their struggle to get away. One of the small shallow pools filled with muddy rain-water was swarming with a small Crustacean, i.e. they were not rushing about, but lay quietly in the water on the muddy ground near the edge of the pool. The lizards here collected were mostly found concealed in heaps of stones. Here and in similar places of this region there was much evidence of the toll paid by cattle to the climate. Skeletons or cadavers of cattle, donkey or sheep were frequently encountered, and bleached bones among the stones were the rule rather than the exception. The domestic animals get so enfeebled in times of prolonged drought that they cannot travel to the water-holes, and if found before they are dead are frequently beyond feeding and drinking and simply lie down and die. There were trees, alive and dead, in the rivier, providing food for insects, and for that reason small numbers of moths and beetles come to the lamp in spite of the interfering wind. The lamp being placed one night behind a wall of loose stones for shelter, a gecko came out and helped himself to a meal.

The landscape from Maltahöhe via Voigtsgrund to near Mariental was very uniform in its geological composition. The vegetation of the plateau is poor as regards trees and shrubs. It is a country for springbuck, of which a herd crossed our pad.

On approaching Mariental (1,080 m.) from the west, the belt of large trees along the Fish river seen from the distance contrasts so agreeably with the monotonous plateau just traversed that, on reaching the rivier, one is rather taken aback by the sand dunes piled up the other side of the sandy dry river-bed and the sandy flatness of the ground on which Mariental is built. This station of the railway from the Cape Province to Windhoek is an important commercial centre, the region being by no means so poor as the sand suggests to the stranger. We stayed only one night, as I was anxious to get to a farm higher up the river where large pools were said to contain fishes. On the hotel bill was an item of over a pound for beer ; however, I had entertained two guests after dinner. We soon found that a shower of rain had rendered the pad impossible for our lorry, for after we left the main road the ground became so soft that we stuck and had to give up the excursion, returning to the road and making for Rehoboth instead. On the way northward we halted several times to see what we could find under and among the stones ; there was little besides swarms of the red migratory locust going north-westwards and resting in masses on bush and tree. On an outcrop of greyish sandstone and quartzite occurred a squat short-horned locust perfectly adapted in colour to the pebbles among which I observed it, and a small Tenebrionid beetle, a species of *Zophosis*, black, but so covered with dust that it became invisible when motionless. I have seen this beetle in numbers in many place in South-West. There were also some weevils and carabids with the colouring of the soil. This colour-adaptation to the background would afford an almost perfect protection if the insects would keep quiet ; their movement destroys the

similarity. Nature has given protective resemblance with one hand and taken it away with the other, and the insects in question flourish nevertheless. Is there an explanation of this contradiction ? Perfect protection coupled with the great fertility of insects would lead to speedy overcrowding, disease and destruction ; the loss account in nature has to be enormous for the safety of the species. All that is needed is the preservation of an average number of individuals, imperfect protection meeting the case. Species adapted to the colouring of the soil generally have a second line of defence : sudden movement and fast running as in the case of the hare ; a sudden jump and then motionlessness as with a grasshopper ; or gregariousness and sudden bewildering dispersal in all directions ; all three lines startling the predator and thus giving the prey a chance to escape, while perseverance gives the predator his chance to get his share of the prey and thus to continue to live. Birds and lizards are much less successful in hunting than man with conscious knowledge, the preserver and the destroyer, the image of divine nature.

When we came to the Ganob, a tributary of the Shaap rivier, close to Rehoboth, we realized that we had been very wise not to stay another night at Mariental. For the rivier was in flood and rising, but still just shallow enough at the ford to make crossing possible. However, our plan to go on to Windhoek the next day was upset by the weather-god. More rain came down in the night, in fact it rained in sheets. When we got up in the morning, the road before the hotel was a rushing stream and remained a river all day. Shouting children splashing into the edge of the water, dogs running up and down barking at the waves as if to chase away these unknown animals. It meant another night at Rehoboth. The road was clear again next day, but between Rehoboth and the railway station there was a large lake blocking the pad we had taken early in the month on our way from Windhoek. So we took the usual pad running straight north from Rehoboth. After a few miles the ground dipped very slightly and became softer in places, water appeared in the ruts and far ahead we saw a car standing still at the side of the pad. Soon the glitter of puddles struck the eye, and when we were close behind the standing car we bumped into a hole. The occupants of the car, Bastards who had been to a wedding and one of whom was playing the guitar to while away the time, were waiting for the water to run off. They helped us to get the lorry going again ; unfortunately after a couple of hundred yards we sat in a deeper hole. After long, hard and unsuccessful labour on the part of my companions and Herr Dammermann of Klein Windhoek, to whom we had given a lift, it was decided to unload the lorry and carry the luggage to a slightly higher dry place near by. Meanwhile, another car had arrived and got stuck near us. Being light it could be lifted out of the pad and was soon on its way again. A small ditch cut across the pad led the water away into the bush ; the lorry was now lifted by a windlass, bushes and branches of hard wood were put under the wheels and in front of them, and at last the wheels took a grip and we were on firm ground. By 4 p.m. we had loaded up again and at 5 p.m. we were back at Rehoboth ; a day's hard work for my companions which deserved an extra drink. There was a third road to Windhoek, going first in a westerly direction and then north via Haris. This pad was on high firm ground, but we were informed that it was blocked by a large rivier in flood. We would risk it, and took this road next morning (the third " next morning ") in the hope that the rivier would have run dry by now.

We were right; the little water in it did not prevent us from getting across, the bottom being firm and the shovel removing the mud and sand piled up at either side.

The season was rapidly advancing; little dales in these highlands were covered with flowers, but no butterflies enlivened the scene; the landscape being exposed to the winds, they could only be expected to occur in sheltered localities. In passing we saw the Knurrhaan tumbling up into the air, and the amusing little meerkat, *Suricata*, which holds the tail straight up when running away. The descent from the highlands to Windhoek required careful driving. Being often very steep and having suffered from the rain, the road was in places far from good for our heavy load. We got safely back to Windhoek, arriving a few days before Christmas, and arranged to leave for another excursion early in January.

Christmas and New Year were spent with my relatives and their friends, merrily in accordance with this festive season. Herr Hoesch sent word that he would be unable to come with me on the next excursion, as he had to attend to business connected with his farm. Meanwhile the rain had come in abundance, and it was reported that all the riviers were in flood. We waited a fortnight for a break in the rains and then set out for the Kaokoveld, intending to travel via Okahandja and Outjo. The landscape below Windhoek was in spring dress, the ground covered with the yellow blossoms of creeping *Tribulus*; the high mountains rising on the other side of the valley, so dead and forbidding in October, shone yellow with blossoms as if they were covered with buttercup meadows. Lower down where the ground was sandy and loamy, progress became slow, bushes had to be cut for covering the black places in the road to prevent the lorry from sinking in too deeply, and we pulled up near the tents of party of men working on the road. The foreman of the party warned us that it would be dangerous to go any farther, the pad would not carry the lorry; and that we could not possibly get across the Swakop, which was in flood, had been so for days and would remain in flood for a considerable time. The black mud in front of us was convincing evidence that the man was right. We had to submit to the inevitable and turned back to Windhoek. While Herr Bartsch discussed matters with the foreman and got the lorry back on to firmer ground, I collected a *Mantichora*, which was common here, and observing the sexes realized that the mandibles of the male have a definite function in mating, the male keeping hold of the female by putting its enlarged mandibles round her waist.

As the rains continued intermittently, all the riviers turned into rushing rivers, carrying everything before them, breaking down dams and interrupting the railways. Cars and lorries which tried to cross a rivier remained in the water. Windhoek was isolated; provisions became scarce; letters arrived only by air mail; farmers who were at Windhoek or Swakopmund could not get back to their farms and whoever happened to be away in the country had to stay where he was. I hoped from day to day that the passage northward would become possible; but in vain. And so I remained at Hoffnung from Christmas to the second week in February.

The hills of which Hoffnung is part consist of dark-coloured gneiss and schist, with bands of quartzite, like all the highlands round about Windhoek. The hill-sides are covered with small flat stones, here and there rocks crop out, decayed into large and small slabs, where scorpions, beetles and lizards sought refuge from sun and rain, and where I collected many specimens either alone or, on

Sundays, in the company of my relatives. The flat stretches of ground were covered with sand, and here large shallow pools had formed, where I vainly fished for Crustaceans. In the small valleys there was deep dark soil washed down from the hill-sides, and here we found under stones, singly, a slate-coloured blind snake (*Typhlops*) as thin as a strong string, also a thicker pale species. At Voigtsgrund we had found only two specimens of lizard with a bright blue tail; here at Hoffnung the species was not at all rare (*Cordylosaurus*). It had the undulating motion of a slow-worm, but was much faster, and attracted everybody's attention by its colouring. As usual in lizards, the tail broke off easily if the specimen was not firmly taken by the head or body. If the Lamarckian principle in its rawest form held good in evolution, namely that offspring inherited characters acquired by parents in their individual life, I am afraid the lizards of Hoffnung would by now consist of races with stumpy tails. The meaning of the fragility of the tail becomes clear in this field-work: the broken-off tail wriggles about and draws your eye, or that of any other aggressor, away from the lizard, which thus finds time to escape safely into a hiding-place. The small viper was not rare in the hills; it simulated the colour of the stones so well that one of us nearly sat down on a specimen that was lying rolled up on a flat stone slab. In a valley just below the plateau on which stood the house of Lütgens were a number of old, brittle, dark-brown termite nests, and it was in one of them that I found a long thin snake, which wound itself round my arm when I took it by the neck; poisonous snakes, like the viper, if thus held, as a rule simply hang down like a piece of rope. On the rocks east of the railway bridge on the Hoffnung side of Klein Windhoek, a beautiful species of *Agama* had her home, the male with orange head and tail and blue body, and the female in a darkish dress with some orange splashes; I did not see the species at Hoffnung. The fig trees in the garden were laden with fruit and visited by some Cetonids in large numbers, mostly *Rhabdotis chalcea* and *Pachnobia cincta*, and by a Noctuid moth, a species of *Sphingomorpha*. A species of *Calosoma* was now very common, running about in daytime, but more often found under stones. In daytime I also collected some specimens of a white Saturnian, not the one observed in great numbers at Tsumeb, but *Usta bioculata*, which has no eye-spot on the hindwing. The specimens were resting in a thorn bush; others came to the lamp here and at Okahandja; *Usta wallengreni* evidently did not occur. The lamp now attracted many moths and beetles, some of the species in profusion; but there were no Sphingidae except the common *Herse convolvuli* and *Celerio lineata livornica*; the latter was on the wing also in daytime, starting about 10 a.m. visiting flowers, particularly those protected by Acacia bushes. The earliest moths to come to the lamp were *Cossidae*. One of the surprises was a brilliantly coloured Agaristid, *Paida pulchra*, which, from its coloration, I had considered to be a day-flier like most Agaristids. The species had preserved its true Noctuid habit, being active at night and concealed by day. I flushed it several times in full sunshine, and it always behaved like an ordinary Noctuid, flying low and fast for a short distance and settling again on the ground, concealing itself in the herbage under a thorn bush. The woolly species of cock-chafer (*Sparrmania*) which in October was attracted to the lamp in such numbers that it became a nuisance, injuring the delicate moths with its claws in climbing about the cage, did not now appear; this was evidently not the season for it. The specimens of this beetle which fell on to the ground or crawled away from the cage immediately began to dig themselves in and in a short time had disappeared.

There is, no doubt, some connexion between the woolliness of the body and this underground life.

Butterflies became more numerous in individuals after Christmas. The widely distributed *Pieris mesentina* was migrating, travelling in a north-westerly direction day after day on a front certainly many miles long; it did not fly in masses, there being on an average only about one specimen to five square yards, stopping to feed for a moment and then going on again, the males more numerous than the females. Among them were specimens of *Teracolus*, probably influenced by mass-suggestion, but most of them remained on the farm, causing some butterfly-nets to be badly torn. The best Pierid was *Teracolus subfasciatus*; it was by no means easy to net, as it was very much on the alert and the wind high. Two species of *Acraea* were on the wing; *A. neobule* occurred in a small wood below the dam where the vegetation was abundant, while *A. stenobea* was found in some numbers on the open, exposed, stony and sandy ground among small Acacia bushes (*Acacia horrida*). Acraeas have a knack of concealing themselves effectively on the ground when covered with a net; several times here and in Angola I was sure I had the specimen under the net, but searched for it in vain. Below the dam where in a wet place *Asclepias fruticosa* grew in profusion, *Danais chrysippus* was plentiful. As it was a very wet season I expected to find occasionally a specimen with white hindwing; whenever I saw one with some white on the hindwing I caught it and invariably had a female of *Hypolimnas misippus* in the net. This female has deceived me again and again on the wing; however, it gives itself away as a Nymphaline when it settles on a dry bare patch of the ground, as do our *Vanessa*, to which *Hypolimnas* is related. I never saw *D. chrysippus* resting that way. On the sandy or pebbly slopes a grey Asilid fly was not uncommon, a brave creature which attacked my legs when I went after it.

The large blue fossorial wasp (*Hemipepsis vindex*) was still much in evidence, and when one day I saw a blue insect of the same size with the hindlegs held backwards fly about an Acacia bush, I mistook it for that wasp; something strange in its flight, however, a certain clumsiness, falling rather than gliding when settling on the bush, made me look again. It was a Longicorn beetle, of the genus *Phyllocnema*, in which the hindtibia is broadened and therefore as distinctly visible in flight as the hindleg of the fossorial.

When the moon was up, the evenings were spent in collecting frogs. The "poap-poap" of the toad no longer attracted me—I had enough specimens, I thought—, nor did I take the bull-frog which I saw and heard in a pond near the dam. But there were four other notes: the "lutter-lutter-lutter" of two species [1] and the castanets as at Maltahöhe, and a note not heard before sounding like a deep guttural "ou-i"; we called this musician "the Student on a Sunday morning after a night of too much beer." The Lutherans were easily located in the pools which had formed below the dam (there were none in the dam itself, the frogs evidently preferring shallow pools), and here were also the castanet players in some numbers (*Cacosternum boettgeri*). But to locate and catch the sick Student was quite a different proposition. A single short "ou-i" and then a long interval; the frogs were somewhere in the herbage round about the ponds, not in the water. You went quietly to the spot from which the note came, and waited: it was in front of you, you played your flashlight and searched the ground; the note came from behind you or from your right or left. It was tantalizing. In order to

[1] Cf. footnote on p. 36.

ascertain whether it was a frog at all, we concentrated on one specimen, we four hunters: Else and Hans Lütgens, Herr Piepmeyer and myself. Tracing the note to a heap of small stones, we knelt down in a circle, flashlights in hand, and removed the stones one by one and finally pounced upon a frog as it tried to escape by a jump; it was a yellow-striped species very different from any I had seen before. Although the call-notes proved that there were quite a number of specimens, we caught only six in all the weeks, and then it turned out to be *Kassina senegalensis*, a widely distributed species of no particular interest to the specialist! The note of these frogs carries very far, being distinct for half a mile away on a still evening.

At Klein Windhoek, where I stayed a week with Herr and Frau Blaschke, drinking "most," eating grapes, and altogether enjoying the beautiful gardens and their products, as well as the pleasant company in the house, I added several species of moths to the collection. *Syntomis damarensis* (not represented in the British Museum or the Tring collection) fluttered about the blossoms of *Pelargonium* at the house and other flowers in the gardens. *Usta bioculata* came to the lamp and also a specimen of the large Saturnian *Gynanisa maia*. Although these moths belong to a family of Silk-spinners, their larvae do not spin cocoons, but go into the ground for pupation, as do most African Saturnians. It is an interesting fact that none of the closely related species of the Indo-Australian Region have lost the faculty of making a cocoon. Why has evolution taken this turn? Why does the pupa of the African *Bunaea* and other genera lie buried in the ground, whilst the pupa of their very near relative, the Indian *Antheraea*, is enclosed in a cocoon of the very best silk and hung up in bush or tree? The loss of the silk-spinning faculty in these larvae is definitely linked with Africa, and the cause of the loss must be due to some evolutionary factor present in Africa, but not in Indo-Australia. The loss cannot be accounted for by a difference in food or climate; for, in the aggregate, a very large number of different plants are eaten by these cocoon-less Saturnians, and cocoon-less species occur in the driest and in the wettest districts of Africa, at low and high levels, in open country and in the forest. But there is nevertheless an environmental factor peculiar to Africa. The influx of antelopes into Africa and their enormous development on that continent may have been so destructive for the free-hanging large cocoons that only those pupae which were close to the ground or covered by accumulations of dry leaves on the ground had a measure of protection, and this process of weeding out may have driven the mature larvae into the ground for pupation. That the habits of animals are affected by a change in the surroundings is well known. Take, for instance, the European sparrow, which originally constructed a large free-hanging nest with a side entrance and now builds under the roofs of houses, as now does also the Cape sparrow in South-West. Another illustration is the nesting habit of the small South African house swallow, *Hirundo cucullata*, which now prefers, for the construction of its long tunnel-like nest, the ceilings of rooms in houses to over-hanging rocks and caves.

I did not see any frogs, nor did I hear their notes, though several species have been recorded from Windhoek and Klein Windhoek. The railway above Klein Windhoek was a fairly good hunting-ground where I picked up numbers of weevils and Tenebrionids, also a few specimens of the Longicorn genus *Phantasis*. On the other side of Windhoek occurred *Tetracha*.

An excursion towards Teufelsbach, with the object of collecting the Pierids

I had seen there in passing at the end of November, did not add much to the collection; however, we found a specimen of *Gynanisa maia* on a rocky hill-side under a loose slab of stone, the colours of stone and moth blending fairly well.

After my return to Hoffnung I devoted a little time to the plants, many of which were now in full flower. The peculiar genus *Lithops* was represented by a very abundant species. Several species of *Tribulus* [1] with their yellow starry flowers covered large stretches of the ground, a pale pink *Oxalis* and two species of *Tradescantia*, one yellow, the other blue, were plentiful. *Indigofera* trailed in low bushes, and on a flat sandy piece of ground there were masses of a beautiful blue flower like a *Scilla*. The plants connected in some way with insects interested me most. On *Rumex nepalensis* I found two species of *Bruchus*; they were feeding, and quite common. I did not ascertain in the pods of which leguminous plant they had developed; I opened many *Acacia horrida* pods, but found the seeds intact; perhaps the beetle larva lives in the pod of *Indigofera*. A Melolonthid beetle similar to *Hoplia* occurred singly or in twos on the yellow flower-heads of a Composite (*Berkheya*) which closed up at night and in the rain, the marginal flowers forming a conical tent under which the beetle was well sheltered. Another Melolonthid occurred in numbers in the flowers of *Crinum*. One of the commonest flowers in the open ground was *Cleome diandra* (*Capillidaceae*), which grows somewhat like *Epilobium augustifolium*, but is an annual. The stamens and pistils project far beyond the corolla, and as they were somewhat curved up, as if to offer insects a support, I expected to see them visited by insects; however, all that came to crowds of this plant in various places were five specimens of bees of two species. A flower typical for districts like Hoffnung was another annual, *Sesamum capense*, with its larger form *grandiflorum*, lilac colour, the shape of the flower recalling a *Malva* or *Campanula*, which I saw again in Angola on limestone hills near the coast. As in a *Campanula*, I found in the flower occasionally small insects which had sought shelter from rain.

Dinter, in *Botan. Reis. D. Südwest Afr.*, 1921, p. 165, in speaking of succulent plants and the various devices to safeguard their water-contents, remarks that there are insects, especially among beetles and grasshoppers, which might also be called succulents, as they keep alive for months without food and water, their external skeleton preventing loss of water as does the epidermis of certain succulents. Dinter mentions the large weevil, *Brachypterus apterus*, as an example of extraordinary resistance. He had packed twenty specimens in a tin between layers of cotton-wool and added a bar of cyanide of potassium wrapped in a damp rag. The tin was forgotten and only opened a year after. All the beetles were alive, crawling over each other; they had eaten the cotton-wool and laid a number of eggs. I remembered this experience when I collected some specimens of this beetle, and therefore put them into a glass jar with a lump of cyanide. They were dead in two days. Perhaps Professor Dinter's tin was not quite airtight.

In the second week of February (1934) communication with Swakopmund by rail was restored, though the damage by the flood of the Swakop had not yet been entirely repaired, and I said good-bye to my dear friends at Hoffnung. The train was reported to leave Windhoek early in the morning, but we did not get off before the afternoon. Half-way to Okahandja we slowed up: a large party was working on the line, an engine was still lying in the rivier, wheels in the air. I went only as far as Okahandja, of which I wished to see more than had been

[1] The few plants collected have been identified by Cecil Norman, British Museum.

possible on the occasions when we passed through it or had stayed for a night. A little wood of tall trees was the remnant of Dinter's experimental plantation of forest trees. Neglect and natural causes had destroyed many of the trees planted by him. Herr F. Gaerdes generously added various welcome specimens to my collection and also drew my attention to an Australian Longicorn beetle which was rather plentiful here (*Phoracantha*), and explained its means of defence. When the beetle is caught, it throws its spiked antennae quickly backwards and presses them against the skin of the aggressor, moving the head up and down as if trying to drive the spikes into the skin. The beetle did not draw any blood, but the spikes gave me the sensation of a rather blunt pin being pressed against the finger-tip. Many Longicorns without spikes on the segments of the antennae have the same habit of trying to free themselves.

The railway journey from Okahandja to Swakopmund took nearly twelve hours. As we travelled at night, and the bed was quite comfortable, I hardly noticed how slow the train was. Swakopmund has been described and praised so often that I need say no more than that it is an oasis in a desert, where it was quite pleasant to wait for the arrival of the boat at Walfish Bay. It was certainly a great achievement of the German administration. The harbour, however, is silting up and has been abandoned since Walfish Bay has been restored to the country. I had my quarters again at the German Hospiz and was very pleased to meet here Frau Elisabeth Schneider, our kind hostess at Okosongomuingo, Waterberg, who was waiting for the railway to take her north to Otjivarongo. On my rambles along the shore I had an opportunity of seeing a little of the scanty fauna of this sandy district. There were a number of small hillocks about a foot or two high, formed by *Mesembryanthemum salicornioides* and sand, which harboured a comparatively rich insect fauna. A small *Mylabris* (Meloidae) and some Tenebrionids occurred in numbers ; also various Hymenoptera were much in evidence, being very lively, among them a *Mutilla* ; some Noctuids were sleeping under the *Mesembryanthemum*, and the fragile Geometrid (*Rhodemetra sacraria*) which was so common at Hoffnung fluttered about as if this was its home, but probably had been brought down from inland by the wind. *Pyrameis cardui* and *Hypolimnas misippus* were also abundant, both likewise wanderers from inland. In the hillocks lived a lizard, beautifully adapted in coloration to the sand, being grey with numerous inconspicuous dark dots (*Scapteira reticulata*). It was very fast and disappeared deep down in the sand of the hillocks. There was much jetsam lying about under which the lizard and various beetles concealed themselves, and here after much searching I caught two adult lizards which had buried head and body in the sand, but had forgotten to conceal the tail as well. A pretty mouse, *Gerbillus swalius*, slept in the hillocks, sand-colour above and white beneath ; it seemed to be more abundant away from the shore on higher ground as testified by the great number of burrows. On the wet sand occurred a species of Cicindelid, *Eurymorpha bohemani*, which fed on what the sea threw up. When a wave rolled back, the beetles ran to the line of small muck left behind and flew up when the wave came on again. I did not see any of them ten yards away from the sea. They were most common where the drain from the slaughter house opened on the shore.

The Swakop, to the south of the town, was in flood, deep one day and perhaps shallow the next, according to the rains inland. At Swakopmund they had had

but one shower. The river had brought down so much soil and wood that a large spit had been formed extending far into the sea. The shore north of Swakopmund was covered with trunks of trees large and small, and under the lamp of the café near the beach crawled many rhinoceros beetles (*Temnorhynchus*), which had probably come down in dead trees. The river had certainly played havoc with the houses and gardens in or close to the bed ; but optimism is a necessity for settlers in a new land, and we may be sure that this flood will be forgotten just as Noah's flood does not influence us sinners any more. However, not every owner of property along the Swakop complained. Dr. Boss, of the German High School at Swakopmund, a botanist who has discovered many new plants, kindly took me to Palmenhorst, a property situated a few hours' drive from the town in a valley flanked by surprisingly high rugged mountains (fig. 27), a sheltered, fertile place for fruit and vegetables. Though the river had torn furrows across the garden, it had more than recompensed the owner by depositing so much humus mixed with manure swept away from farms higher up the river that for years there would be no necessity to buy fertilizers. As at Hoffnung, Cetonids were eating the figs and attacking other soft fruit. There were a few *Welwitchia* left near Palmenhorst. On a hill-side I saw a longish black insect which I took for a Staphylinid. I picked it up and dropped it hastily, for it gave me a most painful sting in the tip of the finger. It was a Mutillid, not a harmless beetle. The specimen escaped among the rocks and thus proved that the sting of an insect can be a protection.

At last the news arrived that the boat would be at Walfish Bay on the third day, and we got orders to pack up and get across as long as the river was low. A large crowd of passengers, and friends to see them off, gathered on the river bank ; some got into hammocks to be carried to the other side, but the large majority went into the water with skirts or trousers tucked up and marched through the broad river, the water coming well above my knees at the deepest place. There we were now, sitting on the sand or portmanteaux, looking back at Swakopmund and smiling at the people still struggling with the water.

The Kuiseb had broken through the dunes and made an exit to the sea ; with the fall of the river the sea had come in through the gap, and many of the houses of Walvis were standing in the water, like the one in which the agent had reserved a room for me. In the water were some small fishes which had come in from the sea. Here we were, with nothing to do but to wait two days for our boat. I had net and killing bottle and some tubes with a little alcohol in my hand luggage and went out exploring the shore. Here the same Cicindelid occurred as at Swakopmund, only in much larger numbers, and behaved in just the same way. Nearly all were of the usual dull copper colour with a touch of green ; but a small percentage, perhaps 1 in 200, stood out by the glossy blue-green colouring. There were no *Mesembryanthemum* hillocks near the shore ; they were farther inland. It was very pleasant to walk barefoot on the wet sand and feel the splash of the little rollers, but when I tried to go home without shoes and socks, the dry sand was so hot that I could not stand it long.

At last the boat hove in sight ; all was bustle. My baggage was safely on board and South-West became a part of the past on which to ruminate. I had come to South-West in order to make zoological collections specializing on certain groups, to see the country and to learn a little about the life and well-being of the white and coloured populations. After an expedition one is always inclined to

regret that one has not done this or that, I might have made the collections more complete with expert assistance or if the roads had been reliable in the rainy season, the best time for insects. However, I got the fishes I came for, collected a good number of Amphibians and Reptiles, small mammals and their fleas, and thousands of insects, besides odds and ends of other classes, with which I had to be satisfied. A road from Walfish to Gobabis and another from the Orange river to Otavi, with reliable bridges over the riviers, built for the good of the country, would be a great blessing for South-West. But where to find the money!

One is accustomed at home to hear the Government of the day blamed for anything that is wrong, or that people believe is wrong, in the management of the country. Letting off steam gives relief. Criticisms of the administration of South West must be taken with a large pinch of salt, be they uttered by Europeans, Boers or Natives. What astonished me most in travelling through the country was the fact that a large proportion of the white and coloured populations speak German, that the street-names are German and that, when in other colonies and in Europe the greedy game of grab was in full swing after the war, here in South-West no farm and no business had been confiscated. A noble monument to the leaders of South Africa. If Europe had had leaders of this fine type in 1919, we should not now be in the mess in which we find ourselves. On sailing from Walfish Bay I looked back to the country with gratitude to the Administration for the permits granted me and to all whose hospitality I had enjoyed and whose help had so materially contributed to the success of the expedition.

Angola.

After I had seen a little of Angola, I was glad that I had gone first to South-West. Apart from the coast region, the south and the sandy far-interior, Angola with its large forests and surprisingly good roads contrasts so favourably with most districts of South-West that a traveller who had enjoyed Angola might easily feel depressed by the severer though healthier conditions of life in South-West. Lobito, where I landed, was a little gem. The voyage had taken three days, the weather keeping fine all the way.

The Colonial Office at Lisbon had accorded me special facilities of entry into the colony and the Acting British Vice-Consul, Mr. Leo L. Davis, saw to all the formalities to which a visitor has to attend before he is free to travel in the country. Guns and ammunition present the only difficulty, as they have to be registered at the military office at Benguela, some 50 km. distant. As a rule, travellers are only allowed a monthly supply of 25 cartridges. However, after mine had been counted, I could take them all back to Lobito and had permission to use as many as I liked on the excursions inland. The British colony at Lobito was most helpful in revising my plans and giving me information about the conditions of travel and about localities favourable for my purposes. Professor E. Stresemann, Berlin, had recommended to me as a suitable companion one of his correspondents, Herr Rudolf Braun, who had been in Angola for seven years, spoke Portuguese fluently and was much interested in bird-life. As he could drive a car and seemed above the average in intelligence, we soon came to an agreement, although I regretted that he had never attempted or been taught to make a mammal- or bird-skin. I hired a car and a small van from the Mamea Trading Co., bought supplies and left in the hotel that portion of my baggage

Fig. 22.—Rehoboth: houses of bastards.

Fig. 23.—Rehoboth, west end: dwellings of natives.

Fig. 24.—Voigtsgrund: the rivier in front and the flower garden at the back.

Fig. 25.—Table mountains between Mariental and Rehoboth.

which was not required on the first excursion. It took nearly a week until a start could be made. The time passed pleasantly with invitations, rambles on the spit on which Lobito is built and a little collecting. The Hotel Terminus where I stayed is a first-class house. The gardens of Lobito, both private and public, have a luxuriant imported tropical vegetation, palms of various kinds, flowering shrubs and perennials. The wild fauna on this sand spit is not rich,

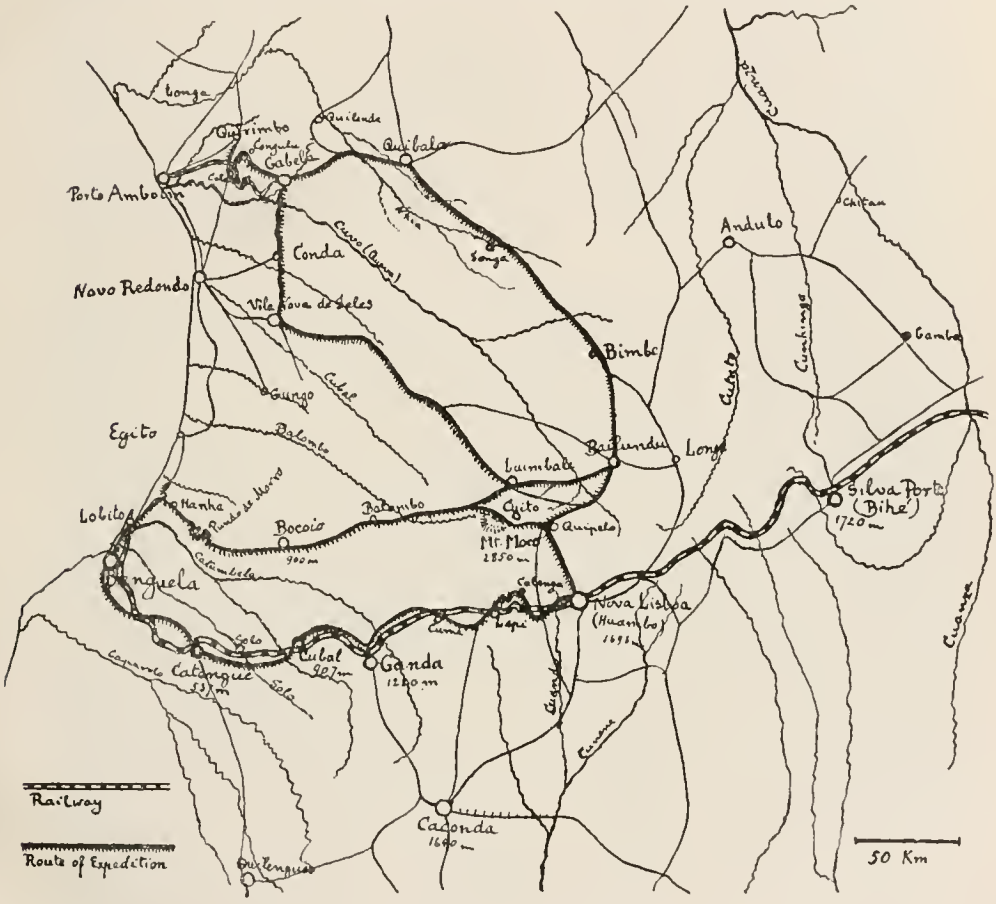

Fig. 28.—Route of expedition in Angola.

of course; but I collected at the lamps of the hotel quite a number of moths and beetles; the burrows of a rat (*Taterona schinzi*) were plentiful on the Benguela side of the town, and several lizards flitted about in numbers.

It was the beginning of March 1934 and the rainy season, when my party, which included two chauffeurs and a cook (so-called), set out for the interior. Our destination was Cuito, a large plantation of the Benguela Estates, Ltd., at the foot of Mt. Moco in the district of Luimbale. The road branched off northward before reaching the Catumbela river, skirted the lagoon at the head of Lobito Bay and sharply ascended to the first plateau, which was dry and mainly covered with coarse grass and Acacia bushes, and farther on some Candelabra

Aloes in flower. After having crossed a valley the road climbed in serpentines to the second plateau. The flora of the valley and the escarpment was very striking, Baobab in the valley, and in a gully of the escarpment an impenetrable picturesque bush with a multitude of high Euphorbias. As the van could not make the ascent, the luggage was left at a farm in the neighbourhood, and the chauffeur drove back to Lobito to exchange the van for another with a more powerful engine, while we went on to Bocoio, a settlement at 900 m. above the sea, with a good Portuguese hotel. Here we waited for the luggage and, as it only arrived late in the afternoon, stayed for the night. There is a little river at a short distance east of the hotel and a native village among bushes and trees, where we saw, on the trunks of trees, on large boulders of granite and on the walls of out-houses, various species of lizards in incredible numbers. From Bocoio the road led gradually upwards, there being a few places where it was steeper, but there was no sharp escarpment. Many little brooks were crossed on adequate bridges ; however, as we were travelling fast in order to arrive at Cuito in good time, we did no collecting.

Before going to Cuito we had to call at Luimbale on the district officer to leave our credentials, a formality to be observed by all travellers who wish to stay a while in a district, the control of strangers being strict in Angola. Luimbale consists, besides the establishment of the official, of a simple hotel plus store, and one or two additional buildings ; the country being open grassland and the forest some distance away, it is not a place for an entomologist. Such stores combined with hotel or inn are found all over the country and all act as filling stations for cars. We had to go back some distance the way we had come in order to get to the branch road leading to Cuito. The plantation was on an undulating plain surrounded by high wooded hills and traversed by a small river with a good supply of water. A row of very large trees was evidence that the place had been in the hands of Europeans for a considerable time. A comfortable dwelling-house surrounded by a flower border and a well-kept lawn, large outhouses, a row of huts for the native farm-hands, trees laden with fruit and a well-stocked kitchen garden gave Cuito a look of comfort and progress. There were European strawberries and apples, American guavas, Japanese loquats and other fruit in profusion. One could apparently grow anything at this height except purely tropical fruit like banana and pawpaw. The raw soil, however, is not particularly fertile : it contains a good deal of iron, which gives it a reddish colour, and gets very hard in the sun, making a good surface for roads. The gardens and coffee plantations have to be specially improved by the addition of humus accumulated in the valleys and swamps. In the absence of the director of the estates we were cordially received by a young Portuguese assistant and the bailiff, who explained to us the the lie of the land and with whom we made arrangements for the building of a camp on a foothill of Mt. Moco, which towered up at no great distance. The few days we had to wait for the huts to be ready we employed in collecting what there was about the farm in our line. A species of toad (*Bufo regularis*) invited us to begin work the evening of our arrival ; it was in good numbers in the small irrigation ditches near the house, croaking all the evening. A row of a bushy *Amaryllid* along two sides of the square on which the house was built attracted the *convolvuli*-Hawk-moth in numbers ; the moths knew no shyness and could be observed at leisure. Several times I took the long tube of the flower between my fingers and,

pressing it when the proboscis was inserted, held the moth for a while, and when I let it go it dipped the proboscis into the next flower as if nothing untoward had happened. In daytime the toad was concealed under herbage in the shallow ditches and the flower border. I saw one close to the house creeping away, and I was just on the point of grabbing it when from under the herbage a snake appeared which was also after the Amphibian and now fell a prey to me ; I took it by the neck and killed it by putting a drop of nicotine in solution into its mouth. The snake was only the thickness of my small finger, but bulged in the middle ; before placing it into the jar, I gently pressed the stomach contents forward, and out came three toads, uninjured and still fresh. A large square of grass behind the house was a good place for collecting small Orthoptera, and a little farther afield numerous fresh hillocks indicated the presence of *Cryptomys*. It was a black species (*Cryptomys bocagei*), and the first specimen I caught provided me with some fleas peculiar to this rodent, *Rooseveltiella georychi*, described from Angola. Later on natives brought dead and alive *Cryptomys bocagei* in numbers, but I never found another flea on them. If a mammal is handled by a human being the fleas—at least the active ones, not those which are fastened by the proboscis to the skin of the host—jump away almost at once ; it may be an inherited trait protecting the flea from being swallowed by the Carnivore which has the flea's host in its jaws. It struck me as peculiar that we saw hardly any lizards, which may be due to the absence of rocks in the neighbourhood of the farm.

After a couple of days our equipment was transported on an oxen-wagon up the hill to our huts. We had chosen for our camp a clearing in the forest at an altitude of about 1,850 m., the Moco itself being stated to reach 2,850 m. The forest of evergreen trees which covers a large part of the highlands from Bocoio to Bailundu is neither high nor very dense, and wherever there is an opening grass takes the place of the undergrowth of bushes. The wood extended up the gullies of Mt. Moco, but did not nearly reach the top, which is a dome covered with grass and herbage, with bare rocks jutting out from the sides. The forest as such is neither impressive nor beautiful, being too uniform, but the monotony is relieved by a multitude of flowering shrubs and perennials along the roads and wherever the sun penetrates to the ground. Two shrubby *Combretum*, with long shoots studded with small scarlet or crimson flowers, and the Labiate *Leonotis leonurus*, 10 ft. high, many-branched, with numerous whorls of orange blossoms, were the most conspicuous. The valley below the camp was partly in cultivation by the natives, maize being here the chief crop, and partly had run wild again. The natives till a piece of ground as long as its fertility lasts, and then clear another plot of tree and bush, the abandoned fields and gardens being promptly occupied by a great variety of herbage.

Though the valley was full of flowers and close to the forest, there were hardly any butterflies, and on the wet sand and pebbles of a brook I saw only some Lycaenids and Skippers, no Papilios and Pierids. The brook had very clear water in spite of the rains, and was not only a great comfort to the camp, but also otherwise a treasure, there being a crab and several species of fishes in it. Small barbels played in pools under overhanging herbage and were easily scooped up with a strong net, one of them attracting our curiosity by a peculiar organ at the side of the head. A self-constructed trap placed mouth up-river on the clean pebbly bottom of the brook contained next morning two species of cat-fish, one slaty

black, the other (a new species) grey with numerous dark spots. When put into a deep muddy recess of the brook, the trap remained empty, and when we had removed it again to a clear bottom, we found it torn, possibly by crabs or an otter. The black cat-fish was obviously common, for the natives brought it into camp to sell; it was quite good to eat fried. The spotted species I did not see again. On the other side of the brook a maize-field was watched over by an old native sitting in a primitive shelter. He was probably younger than myself. His face wrinkled and his look stolid, he did not seem to be troubled by the deep thoughts of a Gandhi; he simply sat day in day out, protecting the maize from depredations.

The district was well populated, native villages being visible in the distance, and the smoke of fires curling up from the forest in many places. The men who had built our huts went home enriched by a few shillings, and soon natives trooped into camp bringing supplies of potatoes, chickens, cabbage, and rats and mice dead and alive, lizards with and without tails, frogs, dead caterpillars and anything they hoped the white men would buy. A large Flying Squirrel and a Lemurid were frequently offered and large and small *Cryptomys bocagei* and the large ochreous *Cryptomys mechowi* were daily arrivals, often in such numbers that we could skin only a few of them. The *C. mechowi* alive is a queer-looking, ferocious creature, its enormous incisors gleaming white, a tool and a formidable weapon. There were no Tree Squirrels, at least we saw none and the natives brought none. The catch of insects in daytime was very poor. For night work we built, above the valley, a platform for the lamp, and attracted large numbers of moths. As in South-West, Cossids were the first to arrive, together with such moths of various kind which were resting near by and were disturbed by the sudden glare of the lamp. Arctiids and Syntomids came after 8 p.m. and Hepialids at 10 p.m., the last being almost as punctual as clockwork. Sphingidae, of which we did not get many, appeared after 10 p.m. No Saturnians were obtained at Moco. I was astonished at the number of individuals of *Paussidae* that were attracted, together with some pale-brown species of *Staphylinidae* which evidently came from ants' nests. The peculiar Paussid beetles have, like a Bombardier Beetle, an apparatus for ejecting, with a faint explosion, a puff of smoke from the tail-end. Melolonthids and Copriids there were in quantities, wood-borers also were common, but Longicorns came in single specimens. We could not take all that arrived; on a good night the gauze cage with the lamp inside was simply covered with fluttering and crawling insects of many orders. Many large Noctuids and clumsy beetles had to be caught and killed simply to prevent them from doing too much damage among the more delicate species. Lasiocamps were difficult to catch on account of their tumbling flight, but frequently they settled for good, hypnotized by the glare of the lamp. A specimen of *Polyptychus* was saved just in time; it was so much like one of the abundant Noctuids in appearance that my companion was on the point of crushing it when I saw what it was. I expected to find at the brook some Trichoptera, but saw none. A species of frog was plentiful in the herbage, taking a long leap into the water when approached.

Life in camp was frugal and pleasant. The rain was sometimes very heavy, but the huts, thatched with grass, were nearly rain-proof, and we had, moreover, taken the precaution of putting a tarpaulin over the end of the hut where my bedding was on a bedstead of rough poles. A couple of chickens generally came into the hut in the evening to sleep in a corner, seeking protection from prowling

animals. The only unpleasantness in the hut was the dry mud with which a termite coated all the framework and everything that stood on the ground or leaned against the poles, the mud breaking away when touched, a shower of dust coming down when in turning round at night one inadvertently knocked against an upright. The termite, however, was not destructive; a boot might be covered with mud during the night, but the leather was not attacked. I might have protected the hut by painting the framework with carbolic; but it was hardly worth doing it for a stay of only two or three weeks.

When nothing new for us turned up, we broke camp and returned to Fazenda Cuito for a night, and had the pleasure of meeting, a few hours after our arrival, the director of the several large estates of the Company, an Australian by birth, who had seen much of the world and appeared eminently fit to keep a large concern in order.

As I did not wish to go back to Lobito the way we had come, we decided to drive to Nova Lisboa and take from there the main road to Benguela, which would give me an opportunity to see other districts of the high plateau and in passing to make the acquaintance of the towns which lie along the Benguela railway. We had sent a letter to the district commissioner of Luimbale notifying him that we should leave his district on a certain date and asking for the return of my papers. The documents, however, could not be entrusted to a messenger, we were informed, and had to be fetched by ourselves. Herr Braun, therefore, went via Luimbale, whereas I took the direct route to Nova Lisboa, where I arrived in the afternoon. I had to wait for Herr Braun nearly till nightfall because the commissioner had gone to Bailundu and Herr Braun had to follow him. Everybody seemed still to call Nova Lisboa by its old name Huambo. The Portuguese delight in changing geographical names, which is very disconcerting for the naturalist who finds the old names on labels in museums and does not know their equivalent on recent maps. Nova Lisboa is a spaciously built place in a rich district, the new capital of Angola, windy, cool and healthy, at an altitude of close on 1,700 m., with good water, electric light and the prospect of great expansion. It lies on the south side of the east-west divide, the rivers and brooks east and west of Nova Lisboa flowing south into the Cunene, whereas those somewhat farther east, at and beyond Silva Porto—the Bihé of museum labels—belong to the Cuanza river system, going north. The main road to Benguela runs more or less in the proximity of the railway. The plateau of Nova Lisboa is open country, with a view of dales, hills and forests; the landscape dotted with high pyramids of granite, naked or with a scanty vegetation in the crevices, remnants of decayed mountains. A small river west of Nova Lisboa called for a halt; it was about 10 ft. wide and 2 or 3 deep. By sweeping with a net under overhanging herbage we captured two species of small fishes, one of them since proved to be new. A native passing by on his way to Nova Lisboa said that it was the Cunene in which we were fishing, and added the information that there were crocodiles in it. However, according to the maps the upper reach of the Cunene is east of Nova Lisboa; our river, therefore, must have been a tributary of it, being most likely the Cuando, from which Nova Lisboa gets its water-supply. I may be wrong, for the smaller rivers of Angola run as yet more erratically on the maps than in nature. A young German on holiday, employed on a plantation in the Ganda district, and to whom we were giving a lift, assisted assiduously in the fishing and the search for insects. When

crossing the railway we collected the little there was between the rails, a few beetles hardly worth taking. The timber of old bridges was a refuge for lizards, which, in some places, swarmed about the old beams and supports, disappearing so quickly in the crevices and holes that we did not get a single specimen, there being no time for fitting nooses and setting traps.

Soon after Robert Williams, a station named after Sir Robert Williams, to whose efforts the railway owes its construction, the road ran up a high divide, attaining an altitude of nearly 1,900 m. and descending in wide sweeps to Lepi. Shortly before reaching Ganda we crossed the upper reach of the Catumbela or a branch of it, a swift-running clear brook, in a small pool of which, under an old disarded bridge, we obtained three species of fishes. From Ganda we had a fine view of the Caconda highlands to the south, where there are many large plantations, maize and seisal (both American) being the main products for export. As it was only mid-afternoon, we hurried on—this being the right word for travelling in a car through a country unknown to you, where there are all kinds of treasures the biologist would like to see and which, instead, he passes by in the maddening haste to get to a place where to eat and sleep. At the suggestion of the merry driver of the van who knew this country, we stopped at Cubal at a small inn. It might have been better (or at least more expensive) to have chosen the Station Hotel with its balcony and garden. However, a room was being cleared and cleaned and the inn had to do. I had hardly got into bed when a painful itching in the sole of my right foot required inspection with the electric torch, and Herr Braun at once recognized the cause of the pain as a jigger which had already bored deep enough to get me on the raw. A little operation got the flea out and a drop of iodine prevented any after-effects from arising. We wished to reach Lobito next day, a long drive. Getting up before it was quite light, to our surprise we splashed into water: the room was flooded. Fortunately our garments and hand-luggage were lying on chairs and table and no harm was done. A heavy shower had come down in the night, and as the boys had forgotten to open the drains in the evening, the water from the higher-lying backyard and garden had to run through the house. The atmosphere in the bedroom was rather damp and full of scents (or smells), but we got over it, and our appetite for breakfast was not impaired.

The road from Nova Lisboa to Cubal had been in fine order all the way, broad, with a hard even surface, and all the brooks spanned by good bridges, a delight to the driver who likes to go at 50 miles an hour rather than at 30. Our party of five increased to eight at Cubal: a Portuguese gentleman who wished to reach Catengue as early as possible asked for a lift, as there was no westward-bound train that day; and a couple of natives, husband and wife in charge of a beautiful native girl, wanted to save the fare to Benguela, so we allowed them to perch on top of the luggage. My driver of the car, a black mission boy from Cape Province, who had been down with malaria on and off, again sat huddled up in the back of the car, and Herr Braun had to continue acting as chauffeur. We travelled through woods on a road which became dirty and bumpy, deteriorating more and more, requiring careful and slow driving; at 11 a.m. we came to the small Solo river and found it in flood and without a bridge. The water was shallow, but a ripple in the middle indicated that there was a bank of sand or mud. "Slowly, slowly," I reminded the driver; but he was optimistic and drove with hurrah, so to speak, into the water, and there we stuck, the front

wheels boring deeper into the mud with each turn. The water entered the body of the car, which gradually began to lean dangerously up-stream. The van, fortunately, was behind us and could pull us back on to dry ground. The van might then have crossed, but it was too risky. There was a village up-river, and after a couple of hours we had a crowd of natives who, by pushing and pulling, got first the van and then the car on to the other side, each man being recompensed by a few pence and the headman by a shilling, quite a fortune. The time of waiting was pleasantly spent by my party in having an alfresco luncheon in the shade of a large tree, and a nap. Going for a stroll, I collected some dragonflies hovering over shallow pools in a field and disturbed a mouse, which led me to its nest under a decaying log, the nest containing many specimens of a small flea, the commonest rodent flea of Angola, *Xenopsylla brasiliensis*. The mouse was an *Otomys* ; I saw several other specimens close to the river under dead reeds. Our three native passengers had gone through the river and made themselves comfortable. After a while our Portuguese friend was seen talking to the man, arguing with him ; he came back to sit down by Herr Braun, quite angry that the native had refused to sell him the girl, whom he wanted there and then. Shocking for a European new to the country. We were in Africa, where bastards abound.

Our trouble with the little river was over, but the road did not improve. It was passable, but too narrow to be comfortable in the bush where you could not see far ahead, and we nearly bumped into a car coming from the opposite direction. It belonged to the official responsible for this road, and who was in it, our Portuguese passenger told us. Some time before we came out of the forest the road dipped into a valley which looked a good collecting ground ; at the rain puddles in the road were swarms of Lycaenids, Hesperids, Pierids and also a *Charaxes* which streaked away on the noisy approach of the car. As it was getting late, we could stop but a few minutes to wait for the van. We arrived before dusk at Catengue, just in time for our passenger to transact his business and catch the homeward train. The inn and store where we put up for the night was simple, but quite good enough to make it the headquarters for a longer stay. With the wooded hills almost before the door and the open calcareous country not far away to the west, a collector could expect good results. But I had other plans and had to return to Lobito.

After the woods were left behind, the road from Catengue traversed a park-like plateau, the vegetation becoming gradually poorer. This plateau has its beauty ; while in the forests the view is restricted and the eyes get tired by seeing the trees pass by in quick and monotonous succession, the eyes can now roam into the far distance where the trees stand still and where there might be antelopes and ostriches, much as in South-West. Nearing the dry coast belt we found on low herbage and on the bare ground a few specimens of a Buprestid, *Julodis*, which I had not seen before except in collections at home. Soon we got a first glimpse of the sea and went down the last hills on a steep road which needed repairing rather badly. Down in the coastal plain puddles, ruts and mud-holes made driving precarious ; the car had to pick its way. When some cows crossing the road obscured the view, we ran into a deep rut, where we stuck. After much churning in the mud, the car gave it up altogether, and the van had to tow us into Benguela, which was not far off. While the car was being roped to the van, I collected a species of *Cicindela* on the sands by the roadside, where

it was fairly abundant. We had luncheon at Benguela, and it interested me to see that our half-caste chauffeur was allowed to have his meal in the same room as the other guests, being treated as a white man, whereas the black chauffeur was asked to leave and to find a meal elsewhere. The van towed us into Lobito, where we created a little amusement among the natives who saw us come in at tandem.

Packing the collections and making arrangements for another excursion did not take long. As it was essential to spend the remaining time of my stay in Angola in an environment different from the high plateau where I had been, my friends at Lobito advised me to take the road along the coast via Egito to Novo Redondo and thence go inland to Vila Nova de Seles or another suitable place in that region, where I should find virgin rain-forest in the hills. The Cape boy, who had been of very little use on the excursion, was replaced by a half-caste chauffeur, and we left Lobito the first week in April by the road around the lagoon as before, and having climbed up the coastal escarpment, turned sharply northward into a deep valley with very steep sides. At the bottom, nearly at sea-level, there was a palm grove, very pleasant to look at, and behind it a small muddy river in flood with the bridge lying on the water and so badly damaged that only a pedestrian could cross it, but not a car. It was the only road northward ; so there was no way out of the difficulty but to go far inland and reach the Seles district from there. It was already dark when we arrived at Luimbale and halted to refill the petrol tank. We were informed by the hotel keeper that the only road to Seles was the one which turned off at Luimbale and that the Bailundu-Seles road was closed because the bridge over the Cuvo (= Queve) had been destroyed by the flooded river. Herr Braun did not believe the man, who, he thought, told us this story in order to keep us in his hotel for the night. However, at Bailundu (now Texeira da Silva for short !), another 60 km. farther east, the information was confirmed ; so we had to drive back to Luimbale next morning and there turn north-west.

The country down to Vila Nova de Seles is mostly grassland with copses and outcrops of rock. Seles is a largish place, not a plantation. We arrived here in the afternoon, and when, on enquiry, we heard that there was virgin forest farther north in the neighbourhood of Gabela, we went on to the " Posto " Conda where there was an inn plus stores. The road to Conda was in the open, very much up and down across narrow gullies, with wooded hills on our left, westward, which looked like a regular row of domed hillocks in the gathering darkness. We made the acquaintance of the Posto officer, who was at the inn (his property, I think), arranged for supper and accommodation and then waited in vain for our van to arrive. Herr Braun had to go back in the car to find out what happened. The explanation was simple and instructive. In one of the gullies the van had been so close on our heels that in taking the steep side with a rush it had to stop in order to avoid bumping into our more slowly moving car. Stopping the loaded van at such a steep place was fatal ; the engine was not powerful enough to climb up without the impetus received in coming down the other side. With the assistance of the car the difficulty was overcome. It was a dark night and I regretted that we were not in camp with the lamp put up. A few moths fluttered about the kerosene lamp of the room where our party, the Posto officer and the family of the inn-keeper had supper.

We travelled now through wooded country and crossed the Cuvo R. on a high, well-constructed stone bridge, the Cuvo running in a deep gully with precipitous sides, the forest extending down to the water, which was clear and shallow. A party of women, with or without a child on the hip, were mending the steep road which the rains had slightly damaged, and soon after the forest came to an end. Gabela was before us, a small town built on a plateau above a small river. Good houses, hospital, two hotels, stores of various kinds, a large central place with the residence of the District Commissioner (" circunscrição ") and rows of trees, a well-ordered, permanent settlement of Europeans. The Commissioner, who could speak French, was very helpful and went out of his way to assist me. He introduced us to the owner of a large coffee plantation with primeval forest, who gave me permission to stay in the house of one of his bailiffs in the forest ; just what I wanted. The hotel Saude, where we remained till next afternoon, came up to its name, except for a certain convenience. However, as an innkeeper once said to us in Algeria, waving his arm : " voilà toute la nature ! "

The house of the bailiff of the Fazenda Congula was on top of a hill. It was divided by parallel walls into five rooms, of which three were placed at our disposal, with a kitchen on the other side of the little plateau, windswept and therefore comparatively cool in the shade. We were here on top of a steep escarpment, with a view over a plain with low hills and patches of woods and with a glimpse of the sea on the horizon. The escarpment, which runs more or less parallel with the coast, is covered with high forest, impenetrable where it is left untouched. Most of it was made suitable for growing native coffee by clearing away the undergrowth, and preserving a large number of the trees as shade-trees, which prevent the ground from drying up. The native workers of Congulu and their families were housed in a small village near our dwelling-house. The government looks well after the natives, who are a great asset for the colony. The houses provided for them have vertical walls of stone or mud ; that is one of the regulations. The natives are not only registered, but work is found for them when they are in arrears with the payment of the taxes, about 15*s.* a man. Drafts of them with their families are sent to the plantations to work off their debts, the planter having to provide, besides the hut and food, blankets and some clothing, which become the property of the worker. The natives of the plantation and all the neighbourhood took advantage of our presence to make some money by bringing live and dead specimens till we had more than enough of certain kinds. At a lower elevation, where bananas grew in profusion, the Puff-adder and the beautifully coloured Horned Viper (*Bitis nasicornis*) were not rare. The natives brought them in regularly, pricing them highly because these serpents are for them a good morsel for the pot. A Puff-adder I emptied contained a family of birds. A dead snake when pressed sideways, i.e. on the ribs, becomes quite lively, which may be the reason for the belief among natives that snakes do not die before the sun sets. The owner of the plantation most kindly kept us supplied with bananas, oranges and lemons ; the lemon was a small kind, not very sour and making a delicious drink. The weather was quite seasonal ; thunderstorms and heavy downpours, sometimes too much for our work, and then again brilliant sunshine. The house being exposed to the wind there were few blood-sucking flies. The soil was nearly black in the forest, but reddish clay below the layer of humus. In clearing away the undergrowth small masses of dry creepers, branches

and twigs had been left hanging among the trees ; by beating this dry wood I obtained many small beetles, among them a single specimen of the smallest Longicorn I had ever seen, smaller than *Gracilia pygmaea*. On tree-trunks felled a short while ago *Sternotomis* and *Callichroma* (and allied genera) were seen in abundance, flying away or dropping quickly when approached. Apart from a few common species, there were hardly any butterflies along the roads and in the clearings. Being surrounded by forest and our lamp shining down the escarpment, moth-collecting was very good. At 10 p.m. a Saturnian appeared, flying round the lamp and dropping in the herbage, a form of *Drepanoptera* new to me ; a *Brahmaea* also was not rare, but always came singly from 10 to after midnight, a very fast flier. The Sphingid *Polyptychus virescens* looked very pretty, but its lovely green colour did not keep ; I ought to have set and artificially dried the specimens at once. When the rain was too heavy, or after the rain had driven us in and then abated or stopped altogether, I placed the lamp at the lee side of the house and here attracted other collectors of insects, toads and frogs. The toads came fearlessly to the lamp-cage and picked off the moths I did not want, thoroughly gorging themselves. To swallow a large moth sometimes involved a struggle on the part of the toad as well as the moth ; the Convolvulus hawk and the Oleander hawk, though attacked by the toads, were let go after a little while, being too large and hard. Once late in the evening, after a severe shower of rain, large numbers of a winged termite came to the cage, slowly crawling up the sides, many of them falling a prey to the toads. Suddenly I noticed a large fly riding on the back of a termite, then another and another. For a minute this slow ride, the fly sitting quite still, was a puzzle. Then I saw the meaning of it. The rider waited for the right moment to turn its horse over and drive its proboscis into it. The fly (*Ochromyia spurca*) was evidently active at night and after the swarm of termites. There were at the cage some smaller but similar flies, possibly the males, all the large predaceous ones being females. The males did not move, did not attack the termites and did not approach the females while these were occupied with their meal.

In the forest below Congulu there were several specimens of *Caloncoba* in flower, somewhat resembling a *Magnolia* from afar. The trees were simply smothered in flowers, and I expected them to be as attractive to insects as they were to me. But there was nothing on them. The male inflorescence of the Oil Palm, on the other hand, a large brown bundle without any showy colouring, was full of small beetles ; most of them were a Weevil, but there were also a few Staphylinids and Carabids. I shook an inflorescence over a bag and counted several hundred beetles and a few spiders. I never saw any beetle on the female inflorescences, which are on the same tree.

Two species of Tree Squirrels were common in the woods below the Fazenda, a brown species (*Heliosciurus rufibrachiatus brauni*, named after my companion) and a smaller striped one (*H. congicus*) ; on the latter we found a new species of flea. Natives brought me also some specimens of a large black Flying Squirrel (*Anomalurus*), with a beautiful long, dense, very soft fur. Under the roof of my room were the sleeping-quarters of a colony of a species of bat lousy with fleas (if I may use this contradiction in terms), both the bat and the flea being widely distributed common species.

A small woolly bee, black with tawny abdomen, like a miniature bumblebee, was a nuisance in my room, where we had our meals. It came in numbers,

foraging, and crawled into everything eatable, particularly anything sweet, tumbling into your spoon and cup and being very busy all day long robbing the larder.

As I wished to find a likely place for camping on the plain below us, we went for an excursion in the car, winding our way down the escarpment on a good road connecting Gabela with the two ports, Novo Redondo on the left and Porto Amboim on the right. At the bottom of the escarpment, where the road forked, there was a fazenda as railway station and inn, Calaongo. The left road, which passed into a wood, appeared the more attractive of the two, but after a short run we were effectively stopped by a broad belt of little runlets looking more like the overflow of a river than a river itself. While Herr Braun and the chauffeur tried to find a passage and finally had to turn the car and then tinker with it because it refused to run smoothly, I wandered about to see what I might bag. Standing close to a bush from which seemed to come a volume of shrill noise as if hundreds of cicadas were chirping, and wondering why none flew away—cicadas being generally very quick to get away when approached in hot sunshine—I knocked at the bush and nothing happened, the noise going on as before. It came from the ground, from a ditch behind the bush with a little water, and there I found the musicians: tiny frogs (*Arthroleptis parvulus*). They were spawning and could easily be caught with the net or the bare hand. I took several dozen, which did not seem to make any difference to the noise. It was the loudest continuous sound I have ever heard any creatures make. I had to shout to make myself understood by Herr Braun. The noise was less metallic than that of cicadas.

We now took the northward road and came to the Posto Quirimbo, where the road to Porto Amboim turned westwards at a right angle. The house was occupied by natives and goats. The surroundings were inviting: bush and grass on swampy ground, oil palms, patches of dense forest and bush on dry ground and the rain-forest not far away. We would make enquiries. As luck would have it, on our way back we overtook a young gentleman carried in a palanka, who was the officer of the Posto, knew all about us and was ready to help. He advised us to make our quarters in his old house, the one we had seen; he would clear the natives out, have the house cleaned and let us know when it was ready. A few days after we paid him a call at the new house he had built for himself on top of a foot-hill of the escarpment and were very hospitably entertained by him and his wife at an excellent luncheon. The life so far away from civilization is not an easy one for a gentle lady, though there may be every comfort in the house and many servants. It was plucky of the young wife to share the life with a husband whose duties of inspection often take him away from home. Both husband and wife were as pleasant and sympathetic as Portuguese generally are, and I left their house with my heart full of good wishes for a happy future.

Our new quarters were well built, the house consisting of a central room with a door at the front and another at the back, and a large room each side. The roof continued down to protect a veranda which ran round three sides of the house. The cars found shelter in a garage and the kitchen was opposite the house. The rooms in which the chauffeurs were supposed to sleep had been too long in occupation by goats; the van and the garage with fresh air were better quarters. The altitude was only 300 m., very low as compared with 850 m. of

Congulu, which we could dimly see above us. The end of the rainy season was near, and it was hot day and night. A very clear brook near by provided us with water and gave us an opportunity to take a cooling bath. The virgin forest was about ½ km. distant. The house stood in an oil-palm plantation, which was in the charge of a native, the plantation not being sufficiently remunerative to be under the direct management of a European. There was no bare ground except on the road and on the drive to the house. Insect-life was more abundant in daytime than at Congulu and Moko. On the shady road through the jungle a species of *Euphaedra* settled on the leaves of bushes or on the ground, and here also the bright-red *Euryphene coccinata* occurred. Along the sunny roadsides *Biblis*, *Precis* and other black-and-orange butterflies fluttered up and down, visiting flowers, and among them I often saw the Agaristid moth *Xanthospilopteryx pardalina*, likewise orange and black, looking on the wing very much like the butterflies, but giving itself away when settling on a flower or leaf with the wings held in roof-shape like a Noctuid. Several Pierids and Papilios congregated on wet patches of the roadside. *Papilio ridleyanus*, which is exactly like an *Acraea* when on the wing, could not possibly have been mistaken for anything else but a swallow-tail when on the mud drinking. The Pierids generally flew fast up and down the roadsides together with the peculiar *Charaxes chmkei* and *Ch. eupale*, which both look as white in flight as a Pierid. The brown form of *Charaxes chmkei* was also present, but less abundant ; it is generally regarded as the dry-season form, which, in this case, was evidently not correct, for some of the specimens were quite fresh and appeared to have emerged from the chrysalis but a short time ago. As natives began to bring in specimens which required skinning or bottling, and as our catch of moths at night was generally abundant and had to be seen to next morning, there was not much time for butterfly-hunting, and a couple of hours with the net, usually from 11 to 1, were exhausting at this temperature. As I perspire very freely, the little breeze was cooling ; but in spots sheltered by the wood or the reeds there was no breeze, only the quivering air of an oven ; then I made for the shade of the forest, sitting down on a rock and embracing another, which, by contrast with the outside temperature, felt as cold as ice.

The first two nights we had the lamp on our veranda. Although some good species arrived, there was no crowd ; we were too low, and decided to use for night-work the empty house standing higher up the plantation which had two stories with a veranda for the upper rooms. As the veranda, which is dimly visible in the photograph (fig. 31), ran along three sides of the building, we could always shift the lamp to the lee side, if the usual south-west wind should change. The light shone over the bushes and into the trees, and the white-washed walls of the house were an additional attraction for the insects. Here we sat every night until midnight and after. Below us in the bush a mongoose of some kind sent its weird cry into the night, probably eyeing us from a safe shelter. Bats were busy competing with us out of reach, and a small species of ant worked hard all the time to carry away the insects which got accidentally crushed when we tried to put the killing bottle or a pill-box over a large species which fluttered up and down the gauze cage among a crowd of small fry. It was enjoyable up there in the dark sweltering night, with new arrivals every second. As in other places, Cossids appeared soon after dark, an orange-spotted *Callocossus* being always hailed with satisfaction. Some common

Hawkmoths, like *Nephele*, *Hippotion*, *D. nerii* and *H. convolvuli*, were likewise early. The better Hawkmoths were late (and for that reason perhaps are rarer in collections), the most frequent being a species of *Praedora*, which generally flopped down and sat still, possibly because it is inconspicuous on the ground, whereas other Hawkmoths violently tumble about and are difficult to secure without a net. Some *Polyptychus* and a specimen of *Poliana buchholzi* arriving about midnight gave zest to the chase and made us forget that we were hot thirsty and sleepy. Beetles came likewise in numbers, often settling on our shoulders, crawling up and tickling our neck, when one involuntarily raised the hand to swipe them away or, as I generally did, to pick them off and have a look at them. A Bombardier Beetle was not rare, and the explosion of its shot sounded almost loud when I touched the beetle on my neck. Long-horned grasshoppers and mantids were always walking about on the cage in several species, the mantids looking at the light and not trying to catch any of the insects which crowded around them ; and a small long species of Cicadidae with the middle of the wings transparent and the apex dark (*Rhaphiophora zephyra*) looked in the transmitted light like a broken stick. In going back to our quarters we passed along a row of orange trees and saw sitting on leaf or fruit numbers of the large Yellow Underwing (*Ophideres*), showing up conspicuously in the light of the electric torch.

The nights were uncomfortably warm. If the windows and doors were left open in order to get a little draught, mosquitoes, and particularly swarms of midges, a real tormentor, came in, and if they were kept closed after the rooms had been " flitted," it got unbearably stuffy. Herr Braun suffered far more than I did. My mosquito-net was in order, and I protected myself against the Simuliums by a butterfly-net too fine for the fly to crawl through. With doors and windows open and the breeze just noticeable, it was not so bad on my bed of palm-leaves, my feet in the sleeping-bag. After we had been a week at Quirimbo, both of us got eczema of a yellowish colour on the neck and in the face. It spread over a large part of my companion's face, being especially irritating around the eyes, so that he could not stand it any longer and went to Gabela to see the doctor. A cooling unguent soon put us right. On our return to Lobito we heard that this eczema was of usual occurrence also at Lobito at that time of the year, and then I guessed its cause : some Meloid beetles allied to the " Spanish fly " came commonly to the lamp, often crawled up our necks and were picked off and thrown away, our hands smearing the cantharidine of these blister-beetles over neck and face. The veranda of our house was a meeting-place for lizards, which were also very numerous at the shed where a native was boiling the palm-nuts, making oil. Our jars, however, were nearly crammed full, as was also a petrol tin, and we had little alcohol left. Therefore we had to stop pickling, leaving room for a few specimens we might catch on the way to Lobito. The fauna of the brook was disappointing ; there were neither fishes nor crabs and hardly any insects. An Elmid beetle, however, was of some interest. It was accidentally discovered by Herr Braun when taking a bath in the brook. At one place the water plunged over a ledge of rock into a pool several feet deep : the beetles were on the vertical side of the ledge under the rushing water. When disturbed by the net, they were carried away a few yards by the water, flew up, dived into the waterfall, and reached their feeding- or resting-place on the rock. I disturbed them several times, always with the same result. The live beetle was not wet, the dead and dried ones get wet when submerged. The coating of

fine hairs was evidently greasy in the live beetles and kept the water off. The beetle is 8 mm. long, narrow, tapering at both ends, convex above and flat and somewhat concave beneath. It was, no doubt, in consequence of this shape and the greasiness of the coat that the force of the falling water did not drive the diving beetle back but forward.

I am much interested in the tropical forms of the moth-family Zygaenidae and was always on the look out for them. One day, when after an Agaristid among the bushes, I noticed a Zygaenid high up on a flowering bush, raised the net, struck and let the net fall—for I had stepped into boiling water, or what felt like it! I tore away to the road, beat off the large black ants that ran up my legs and body, got the leather gaiters off in record time, and removed the ants which had buried their mandibles in my skin and dosed me with formic acid. The sting of bees, wasps and the bite of ants are said to be a remedy for rheumatism. Bear the pain in that heat ? Too Spartan. I applied ammonia.

The district was known to be infested with various diseases, such as sleeping sickness, malaria and filariosis, and we had to keep our eyes open for the vectors of these delights of the wilderness. Tsetse settled now and again on my trousers. *Chrysops* also was there ; it once took my nose as an object for exploration and was quickly removed into the killing bottle. These flies are very quiet ; they do not announce themselves, and I did not notice their approach, especially in the case of the tsetse ; they are suddenly there on your garments. The flowers of Papaya trees near our house attracted Sphingidae and some Noctuids at dusk, but only common species.

When a couple of days had passed without a shower of rain, and the heat increased and the Simuliums became fiercer than ever, we packed up and said good-bye to Quirimbo. During the time of our stay at Fazenda Congulu, there was a good deal of rough herbage among the coffee bushes in the forest ; now in climbing the escarpment on our way to Gabela, we saw that all had been cleared away ; the plantation looking spick-and-span. We collected our identification papers at the office of the Gabela circunscrição, had a civilized luncheon at the hotel Saude and left the hills and forests of the escarpment for good.

In order to avoid the rather uninteresting stretch from Vila Nova de Seles to Luimbale, we decided on a more northern route via Quibala. We were in open country, more grassland than bush, and between Gabela and Quibala some fires were already in progress, consuming grass and shrubs. Quibala is one of the older settlements, with an abandoned fort, now unnecessary, the natives being well in hand since the last disturbance. The hotelier presented to us next morning a copy of the rescript of the district commissioner of Quibala, according to which every stranger visiting the place has to report himself to the office within 24 hours. We certainly did not want to stay in Quibala all the morning. Interpreting the rescript as applying only to visitors who stay at least 24 hours, we paid our bill and went our way, the hotelier smiling and shrugging his shoulders. The commandante of the place, I was informed, had the reputation of being very strict and an excellent road-builder. We could do without the strictness of officialdom, but were very grateful for the good roads ; they were indeed very good. Going along here at 40 miles an hour or more just after the rainy season conjured up the memory of the roads in South-West. A comparison, however, is particularly odious in this case. In Angola the roads are being kept in repair by the native population under the supervision of the officials of the

circunscrição. The state of the roads, therefore, depends on the administrative ability and zeal of the district commissioner, the number of natives that can be conscripted for the work and the suitability of the ground. The work is chiefly done by women and children, who carry the soil on pieces of bark placed on their heads. Trees with oblong pieces of the bark missing are a common sight all along the roads. Such pieces are also turned into cylinders and used as hives for wild bees, the hives being placed horizontally in forks of trees. Wherever there is plenty of water, the native population is large, and in consequence the roads good to excellent. The dry limestone belt near the coast has few inhabitants and therefore comparatively bad roads. The brooks and rivers I saw in Angola run in channels with definite banks, which facilitates bridge-building.

We very gradually ascended to a higher level. At 100 km. from Quibala we crossed a little river and halted to try our luck. We got several fish, representing a new species. According to the map, it was the Nhia, a tributary of the Longa, which reaches the Atlantic 40 or 50 miles north of Porto Amboim. Here, far away from forest, we also found *Charaxes nichetes*, apparently an inhabitant of the open grassy country with bushes along the water-courses and damp ditches. Soon the wooded Bimbe Mts. came in sight, where I intended to camp for a night. However, I did not see a suitable spot during our slow ascent on a winding road, and when we were on top it seemed hardly worth our while to drive to a plantation and make camp. So we went on along seisal plantations to Bailundu, which by now was a familiar dorp to me. As it was still early in the afternoon we went for a little excursion to the grassland near by with a definite purpose. The grass is burnt in the dry season, and when it begins to sprout again the young short-horned grass-hoppers that feed on the young shoots have been observed to vary from green to black, being an astonishingly good colour-adaptation to the black stubble and green shoots. I wanted to ascertain if possible whether the adult grasshoppers in the long dry grass showed an indication of the burnt-grass coloration. The Orthoptera were evidently rare at this season ; I got only a small number of specimens at Bailundu, and two days later on the chalk-ridge near the coast, and none suggested the colour of burnt grass and fresh shoots. When looking up from my labours with the sweeping-net in the long grass, what a shock ! My car was on fire and the chauffeur hard at work to beat the flames out with his cap, in which he miraculously succeeded. The usual carelessness, lighting a cigarette and dropping a match still burning. Before dinner, when it was getting dark, I saw some Hawkmoths at the row of Pelargoniums in front of the hotel and caught two, *Nephele aequivalens* and *Xanthopan morgani*, which I had not collected elsewhere.

Owing to engine trouble we had some delay in the morning, and as I still had a few days before it was necessary to be back at Lobito, we travelled more slowly and made camp during the afternoon at the roadside in the forest between Luimbale and Balombo. In strolling in the wood looking at flowers I saw on a tree a large number of caterpillars of the Saturnian *Cirina forda*. The moonlit night was beautiful, and looking up from my bed in the silent forest through the roof of trees into the starry sky gave me a feeling of great peace.

On the way down to Bocoio we nearly ran into a telegraph wire on turning a corner. The pole was broken, and the wire stretched across the road at the height of the windscreen ; Herr Braun just managed to pull up in time to avoid a nasty accident. At Bocoio we had the pleasure of meeting the German Vice-

Consul and his wife, whose acquaintance I had made at Lobito, and we heard to our surprise that it was Whit-Sunday. We did not stay long, as I wished to reach before dark the escarpment with its interesting dry-land flora, where I intended to camp, as there was a chance to find something we had not collected before. To our disappointment—or I should say, my disappointment—we found no place on the escarpment for parking the two vehicles and making a camp, however primitive. Therefore we crossed the valley and stopped for the night at the remnants of a house which a doctor had occupied when attending to an outbreak of some illness among the scanty population this side of the highlands. It was quite a good spot for camping and collecting, the only drawback being that the water had to be fetched from the valley, there being no well or brook near the house. We were on limestone, covered with grass, herbage, acacias, and creepers, with a few trees, one of them large and well grown in front of the house. The roof of the house was gone ; inside we found geckos asleep on the walls and in holes in the walls. A shed snake-skin hanging down a wall frightened the cook, who had intended to sleep in one of the rooms. During the afternoon and next morning I collected various Pieridae, the best being a small series of both sexes of *Teracolus walkeri*. I slept very well under the tall tree, hands and head protected by butterfly-nets. When I woke up my companions told me that they had not been able to sleep and had passed the night with the moth-lamp burning. They had caught among other species a *Ludia* which we had not previously obtained. Water being scarce, we had to be content with a dry rub down.

The road from Morro de Pondo, as the place where we camped was called, to the coast was in indifferent repair. There was little in the dry grass, a few *Teracolus* and some succulents and other plants I had seen in South-West, for instance *Sesamum grandiflorum*, with large lilac flowers.

We arrived at Lobito in time for luncheon, and being too dirty for the dining-room and too hungry and thirsty to wait until we had had a thorough clean up, Herr Braun and I had a meal and several drinks in my room, a veritable bank holiday feast.

In order to get permission to leave the country, the guns and ammunition had to be taken for inspection to Benguela. The cartridges were counted, and I was presented with a bill for £7 for those we had used. I did not think they had cost me so much, but the traveller must contribute to the cost of administration. Travelling in Angola is safe and pleasant, which is worth a great deal in a tropical country.

Lobito looked its best ; the vegetation as luxuriant as ever. Strolling in the hotel garden one evening I noticed some rills in the sand and, following them up, expected to find earthworms, but it was a black slug, which I found next morning to be quite abundant in the flower-beds.

I said good-bye to my friends at Lobito who had received me so kindly and helped me in many ways, and to whom I express here my sincere gratitude, in particular to Mr. Leo L. Davis and the Portuguese officials.

The specimens collected in South-West and Angola are the property of the British Museum with the exception of the Lepidoptera, which are in Lord Rothschild's Museum at Tring. Reports on some groups of the material will appear as and when the manuscripts are ready for publication. It is not to be expected that all the insects and other evertebrates will be worked out in the near future.

Fig. 29. Coffee bushes and shade trees at Conguln, the undergrowth cleared away.

Fig. 30. Oil-palm plantation at Quirimbo.

Fig. 31.—Quirimbo: in the background the empty house on the veranda of which we collected insects at night.

Fig. 32.—Road between Lumbale and Bocoio: a party of natives, mostly women and children, working at the road under an overseer.

Fig. 33.—In the public garden at Lobito.